CONTENTS.

SECTION I.

THE CHOLERA EPIDEMIC.

Para.		Page.
1	The epidemic was very widespread	1
2	The area covered by it is generally indicated in the annexed map	1
3	General statistics of cholera in 1869	1
4	Detailed information regarding troops and prisoners will be found in the Annual Tables	2
5	History of the epidemic will be confined chiefly to troops and prisoners	2
6	Plan of the report	3
7	Measures adopted to procure information	3
8	Tour through affected cantonments	3
9	Conciseness will be aimed at as far as possible	4
10	Dr. Bryden will add a chapter on the general aspects of the epidemic	4
11	Statistics received of individual regiments and stations do not always correspond with the figures given in the Tables	4

CHAPTER I.

HISTORY OF THE EPIDEMIC.

Para.		Page.
12	The history of the epidemic will be given geographically	5
13	Cholera in Lower Bengal—There were singularly few cases among the European troops there	5
14	The native troops in Bengal Proper suffered more severely	5
15	Cholera was less prevalent among the prisoners in Bengal Proper than usual	5
16	There are no returns to show the extent of the disease among the general population of Bengal Proper	5
17	Complete exemption of European garrison of Fort William	6
18	The sanitary condition of Hazareebaugh unsatisfactory	6
19	Effect of impure water used by the police	6
20	No communication discoverable at Hazareebaugh or Ranchee Jails to account for the appearance of the disease	6
21	Cholera was more than usually prevalent in Assam	7
22	Dr. White's opinion is opposed to the idea that the disease is imported into Assam by Bengal coolies	7
23	Dr. Meredith believes that it is imported	8
24	General statement of results in Bengal Proper imperfect	8
25	The area indicated in the second group of stations was severely attacked in 1869	10
26	Many of the European troops in this group were attacked	10
27	The native troops at these stations had few cases compared with the Europeans	10
28	The epidemic among the prisoners in this group was severe only in a few jails	10
29	The records of cholera among the people of this area are imperfect	10
30	Facts of interest regarding the Gya Jail	10
31	The outbreak in Patna Jail is believed to have been due to impure water	11
32	Cholera at Dinapore was chiefly among the native troops	11
33	No evidence of communication in Arrah, Chumparun, and Chuprah Jails	11
34	Only a few cases occurred among the troops and prisoners at Benares	12
35	Sanitary defects at Chunar	12
36	The epidemic in the Azimgurh Jail	12
37	Particulars regarding Jounpore and Goruckpore	12
38	The prisoners at Bustee, Gondah, and Baraitch escaped	13
39	The European troops in Fyzabad Cantonment were attacked	13
40	Roy Bareilly was attacked slightly—Neighbouring district jails escaped	14
41	Cholera in Lucknow. There were only two cases among prisoners	14
42	There were only three among the native troops	14
43	The European troops suffered much	14
44	In the 5th Lancers several cases are mentioned tending to show the communicability of the disease	15
45	Muchee Bhawun Fort	15
46	Contrast between the extent of cholera among the European troops and the small number of cases in the city of Lucknow	15
47	Seetapore was attacked slightly	15
48	Nawabgunge Jail escaped	16
49	A few cases in Oonao	16
50	Only two cases of cholera among the native troops at Cawnpore	16
51	Three cases in the wing of the 19th Hussars	16
52	Five cases in the Royal Artillery	16
53	Twenty-one cases in the 1st Battalion, 14th Foot	17
54	Cholera at Allahabad. In the city the disease was more or less prevalent from January to September	17

PARA.		PAGE.
55	In the civil station and among railway servants, there were only 22 cases between April and September	17
56	Statistics of cholera among railway employés at Allahabad, 1859—1869	18
57	Remarkable immunity of the railway men as compared with British soldiers at Allahabad	19
58	Nineteen prisoners attacked in the district jail	19
59	In the Central Prison efficient quarantine was enforced, and there were no cases	19
60	Sixteen cases in the two native regiments	19
61	Nine cases in the Royal Artillery	19
62	In the 58th Regiment the epidemic was severe	19
63	In this regiment there were 133 cases and 91 deaths	20
64	The wing from Darjeeling and the recruits from England suffered much more than the wing which had been at Benares	20
65	The opinion of the medical officers at Allahabad is opposed to the idea that the disease was spread by human intercourse	21
66	A special committee was appointed to report on the sanitary condition of Allahabad. Its recommendations	22
67	Comparison of cases among troops, prisoners, and the general population in this second group	22
68	Remarkable immunity of the districts and stations comprised in the third group	23
69	General results in this group as regards all sections of the community	23
70	The district of Etah was almost free from the epidemic	23
71	There were also very few cases in Futtehgurh	23
72	Particulars in certain districts of this group	23
73	Cases at Meerut were believed to have been due to importation	24
74	Dr. Moir's opinion on the arrangements for treating residents of bazaars, &c., attacked	24
75	Cases of cholera among European troops at Meerut occurred late in the season	24
76	Statement illustrating the immunity of this third group	25
77	Great prevalence of cholera in the fourth group	25
78	As it affected the general population	25
79	Amongst the prisoners in the Central Provinces	26
80	Cholera at Jubbulpore. Epidemic among the general population	26
81	There were 18 cases among the prisoners	26
82	Among the troops the 2-12th Regiment was chiefly attacked	26
83	Cholera was very severe at Saugor in the 1-7th Royal Fusiliers	27
84	Unfavorable experience of moving into camp in this corps	27
85	The Royal Artillery were not attacked till later, and suffered much less	27
86	Nine prisoners attacked. General population suffered much	27
87	The Lullutpore District and Jail	28
88	Nine cases at Nowgong in the detachment of the 2-12th Foot	28
89	In Jhansi Cantonments there were 57 cases in the 93rd Highlanders, but only 9 deaths	28
90	Five cases in the detachment of the 93rd at Seepree	29
91	Great prevalence in the Gwalior State	29
92	The sufferings of the people from want and disease were extreme	29
93	Seventy-two cases among the Royal Artillery at Morar	29
94	The disease in the 103rd Royal Bombay Fusiliers was very severe	30
95	Native troops suffered slightly	30
96	The statement that cholera had prevailed in former years on the site now occupied by Morar Cantonment is unfounded	30
97	Cholera in the fortress of Gwalior	31
98	Very slight in the Agra Cantonment	31
99	Eleven cases among the prisoners at Agra	31
100	Cholera very severe in Rajpootana	31
101	Eleven cases in Ajmere and 35 in the Beawur Jail	32
102	Cholera was very prevalent in Central India	32
103	Statement showing the prevalence of cholera over the area forming the fourth group	32
104	Cholera in the Punjab generally less severe than in 1867	33
105	The prisoners as a body had few cases	33
106	Native troops at certain stations were attacked with unusual violence	33
107	High admission-rate among European troops due almost entirely to the outbreak at Peshawur	33
108	Individual cases at certain stations	33
109	The outbreak in the city of Umritsur	34
110	Report of special committee	34
111	Seven cases among the prisoners	34
112	Nine cases among the Europeans in the fort of Govindgurh	34
113	Cholera at Lahore believed to have been imported from Umritsur	35
114	Sharp outbreak in the Lunatic Asylum	35
115	Meean Meer escaped	35
116	A few cases at Nowshera	36
117	The epidemic in the Peshawur Valley. General population	36
118	Its great severity in the city	36
119	The disease in the villages	36
120	No evidence of importation	36
121	In the jail 31 prisoners attacked	37
122	The native population of cantonments suffered much	37
123	General results among the troops	37
124	Native troops, 18th Bengal Cavalry, 31 cases and 18 deaths	38
125	19th Bengal Cavalry, 22 cases and 9 deaths	38
126	3rd Regiment, Native Infantry, 36 cases and 20 deaths	38
127	19th Punjab Native Infantry, 43 cases and 27 deaths	38
128	25th Punjab Native Infantry, 24 cases and 22 deaths	28
129	Sappers and Miners were early moved to Cherat	39
130	In the Royal Artillery, out of 4 batteries, there were 56 cases and 38 deaths	39
131	In the 36th Regiment, 202 cases and 117 deaths	39
132	Women and children left behind in cantonments	40

Para. Page

133 In the 104th Regiment, 119 cases and 77 deaths. The left wing removed from the valley on 13th had three cases 40
134 The right wing, which left on the 17th, had 68 cases 40
135 Contrast between the two wings as regards the number of cases of cholera 40
136 The depôt left behind in cantonments had many cases 41
137 Sanitary condition of Peshawur very unsatisfactory 41
138 Immunity of the fort 41
139 In Kohat the native troops forming the garrison were attacked with unusual violence .. 42
140 General facts connected with the epidemic at Kohat 42
141 The water-supply at Kohat is very impure 43
142 In Bunnoo the epidemic was much less severe 43
143 Statement showing the comparative prevalence of cholera in the districts and stations of the Punjab during 1869 44
144 Very little is known of the cholera in Cabul 44
145 Remarkable immunity of the hill stations generally 45
146 Outbreak at Subathoo 45
147 Statement showing the remarkable immunity of the hill stations 45
148 General statistics of cholera among European men, women, and children, and among the general population according to provinces 46

CHAPTER II.

EXAMINATION OF SOME IMPORTANT QUESTIONS CONNECTED WITH THE HISTORY OF THE EPIDEMIC.

49 The information regarding the epidemic is imperfect 53
50 Important questions to be discussed 53
51 The evidence does not show that cholera was spread over the country by human intercourse . 53
52 The evidence against importation is of necessity chiefly negative 53
53 The facts adduced in support of the theory of human intercourse being the means by which the disease is spread are very few 54
54 The statements regarding importation should be strictly investigated at the time .. 54
55 The difficulties of making a thorough examination of them are very great ... 54
56 Preconceived theories are incompatible with an impartial examination of the facts . . 55
57 Importance of an accurate record of the exact date on which the first case in each locality occurred 55
158 No evidence regarding communicability is to be obtained from the number of attacks among the attendants on the sick 55
159 Was the spread of the epidemic due to water tainted with cholera discharges? 55
160 At Umritsur the facts do not point to water contaminated by cholera discharges as the means by which the disease spread 56
161 The experience of the prisoners at Umritsur rather favors the opposite conclusion . 56
162 The facts of the Peshawur epidemic tend in the same direction 56
163 At Kohat there is no evidence of any such contamination 57
164 Nor is there in the general history of the epidemic over the country 57
165 The unprotected state of the wells extremely apt to allow impurities to enter them ... 57
166 These remarks apply only to the alleged spread of cholera by means of water said to contain the specific poison of the disease 58
167 More detailed information required as to the effects of water-supply drawn from different sources 58
168 Much still remains to be done to improve the sanitary condition of military cantonments ... 58
169 The position of cantonments near large cities presents a great difficulty in the way of sanitary improvement 58
170 Preventive measures adopted 59
171 The effect of moving into camp generally is favorably spoken of 59
172 Great loss of the 58th Regiment at Allahabad in spite of movement 59
173 Also of the 62nd Regiment at Lucknow 59
174 And of the 1-7th at Saugor 60
175 The movements of the European troops within the Peshawur valley were generally unsuccessful 60
176 A general influence seemed to pervade the valley 62
177 Particulars regarding the movements at Kohat are wanting 62
178 Success of the movements at Morar 62
179 Moving into camp, although the best means of checking the further spread of the disease which is yet known, is not a panacea 62
180 The principle on which the procedure is based 62
181 The data regarding the effects of intemperate habits in favoring attack are imperfect . . 63
182 The results according to age show no uniformity 63
183 Regarding the influence of length of residence in India, information is still defective ... 63
184 Comparative prevalence and fatality of the disease among men, women, and children ... 64
185 Statistics regarding officers are imperfect 64
186 Remarkable immunity of native troops as a body 64
187 Latrines and barracks altogether fail to explain these differences 64
188 Individual cases illustrative of this statement 66
189 The immunity of native soldiers not to be accounted for by their want of susceptibility to malarious influences 67
190 The places which were attacked by cholera were not invariably those which afterwards suffered most in the fever epidemic 67
191 The comparative immunity enjoyed by the prisoners 67
192 Illustrated by the experience of the jails in the North-Western Provinces 67
193 Overcrowding is an evil which existed in many jails during 1869 67
194 The meteorology of the year in connection with the epidemic 68

CHAPTER III.

PARA. PAGE.

THE PRACTICAL MEASURES TO BE ADOPTED FOR THE PREVENTION OF CHOLERA.

195 General sanitary improvements ... 69
196 For cantonments ... 69
197 For cities ... 69
198 For villages ... 69
199 Special rules regarding measures to be adopted when cholera attacks British troops ... 70
200 Movement from the infected locality the principle chiefly inculcated ... 70
201 Abandonment of infected areas ... 70
202 Disuse of the terms "epidemic" and "sporadic" as applied to individual cases of cholera objectionable ... 70
203 The term "choleraic diarrhœa" abandoned ... 71
204 Importance of locating European troops in the hills so far as possible consistent with other considerations ... 71
205 Importance of concentrating all the statistics of any epidemic ... 71
206 Accurate statistics regarding officers much required ... 72
207 Daily registers of the cases in the city, bazaars, &c., should be kept ... 72
208 Instructions for a general enquiry into cholera by the War Office Sanitary Commission ... 72
209 Special investigation by Drs. Lewis and Cunningham ... 72
210 A series of observations is now being made in order to test Pettenkofer's theory of cholera ... 73
211 Arrangements have been made for providing military authorities with the earliest information regarding a threatening epidemic ... 73
212 Early information may eventually enable us to form a correct estimate of the probable course of an epidemic ... 73
213 The value of Dr. Bryden's report on cholera ... 74
214 Statistics of cholera on board emigrant ships supply some striking facts ... 74
215 Native Passenger Act of 1870 ... 74
216 The effect of sanitary improvement in checking cholera within its endemic area ... 74

SECTION II.

EUROPEAN TROOPS.

217 The death-rate during 1869 has equalled 42·89 per 1,000 ... 76
218 Independent of the loss from cholera, the death-rate has been higher than in any year since 1859 ... 76
219 The diseases arranged according to the proportion of mortality each occasioned ... 76
220 Fifty deaths occurred out of hospital, of which 20 were suicides ... 77
221 The proportion of cases of sickness exceeded that of any year since 1863 ... 77
222 The different forms of sickness arranged in order of prevalence ... 77
223 Sickness was at its maximum in November ... 77
224 The average number daily in hospital was larger than in any year since 1865 ... 78
225 The statistics of the garrison of Bengal Proper were more favorable than those of the army generally in any other of the groups ... 78
226 The general health of the garrison of Fort William contrasts very favorably with the results at Dum-Dum and Barrackpore ... 78
227 The general results in the second group are very unfavorable ... 78
228 Especially at Benares, Fyzabad, Lucknow, and Allahabad ... 78
229 Several regiments in this group, and especially the 58th, lost very heavily ... 78
230 Independent of cholera the results in the third group for 1869 are very unfavorable ... 79
231 At Meerut and Delhi the returns are the most unfavorable ... 79
232 The statistics of the fourth group of stations are more unfavorable than those of any of the other groups ... 79
233 Excepting Agra the returns from all the stations show badly ... 79
234 The high mortality in the Punjab due chiefly to the heavy losses at Peshawur ... 79
235 The general unfavorable statistics of the province for 1869 must be read in connection with the very variable results at different stations ... 80
236 The meteorology of the different provinces should be taken in connection with their sanitary history ... 80
237 Meteorology of the Lower Provinces ... 80
238 Meteorology of the North-Western Provinces ... 82
239 Meteorology of the Central Provinces ... 83
240 Meteorology of the Punjab ... 85
241 The importance of embracing the meteorology of India in one report ... 86
242 Small-pox was more prevalent and fatal than in any year since 1861 ... 86
243 Revised rules to be observed with regard to tents, &c., used by small-pox cases are about to be issued ... 86
244 Fevers have been more prevalent than in any year since 1863 ... 86
245 Fevers were very prevalent in all but the first and second group of stations ... 87
246 Individual stations suffered much more than others in each of the three last groups ... 87
247 The statistics of previous epidemics of fever ... 87
248 Statistics of fevers from 1859—1869 ... 89
249 The connection between the prevalence of fever and the meteorology of the year cannot be satisfactorily explained ... 89
250 Different years with similar rain-fall show very different prevalence of fever ... 89

PARA.		PAGE.
251	Apoplexy was more fatal than in any year since 1859	90
252	Dysentery and diarrhœa were more prevalent and fatal than in any year since 1863	
253	Delirium tremens was considerably more prevalent than in 1868	
254	Hepatitis was more fatal than in any year since 1858	
255	Venereal diseases were as prevalent in 1869 as in 1868	
256	Comparison of the stations in these two years ...	
257	These statistics include both primary and secondary forms	
258	Relation of age to mortality	
259	Returns of married and unmarried soldiers	
260	Comparative sickness and mortality among married and unmarried soldiers	
261	Dr. Bryden's memorandum on these statistics	
262	The loss from invaliding was heavier than in any previous year	
263	This result has been due chiefly to the large number of men sent home for change of air ...	
264	Comparison of stations	
265	Comparison of regiments	
266	Sickness and mortality among women	1
267	Sickness and mortality among children	100
268	Information regarding ages of children will be given in the Tables for 1870	100
269	Measures have been adopted to test the new standard plan of barracks	100
270	Alterations in plans already adopted	100
271	Great success of employment of soldiers on road-making from 1863—1869	101
272	Soldiers' gardens and work-shops	104
273	Analysis of water in military cantonments. Fifth and sixth reports	104
274	Sixth report on water analyses	104
275	Remarks by the Army Sanitary Commission on water-supply in India	101
276	Entozoon in ration beef	105
277	Mattresses and pillows for iron-trestle cots	105
278	Tatties to be used during the night when temperature equals 95°	106
279	Disposal of the sewage of military cantonments	106
280	Trench latrines for native troops	106
281	Statistics of the ten years 1860-1869	106
282	Meeting with the Army Sanitary Commission	106

SECTION III.

NATIVE TROOPS.

283	General arrangement of the statistics of native troops	107
284	The mortality of the regular native army was higher than in any year since 1859 ...	107
285	Diseases arranged according to ratio of mortality they occasioned	107
286	The sickness was greater than in any previous year	108
287	Diseases arranged in the order of greatest prevalence	108
288	Results in the first group of stations	108
289	Results in the second group of stations	109
290	Results in the third group of stations	109
291	Results in the fourth group of stations	109
292	Results in the Punjab stations	110
293	Results in the Central India Irregular Force	110
294	Results in the Punjab Irregular Force	110
295	Results in the Madras regiments serving in Bengal	111
296	Chief causes of sickness and mortality Fevers	111
297	Apoplexy	111
298	Dysentery and diarrhœa	111
299	Venereal diseases	112

SECTION IV.

JAILS.

300	The average number of prisoners has been greater than in any previous year	113
301	Large increase due to privation	113
302	Illustrated by the general decrease after the rain-crop harvest	113
303	Same causes have increased sickness and mortality during 1869	113
304	General results of 1869	114
305	Chief causes of mortality in 1869	114
306	Monthly fatality from the chief diseases	114
307	Chief forms of sickness in 1869	114
308	Monthly prevalence of each form of sickness	115
309	General results in the first group were very favorable	115
310	Excessive mortality in many jails of this group	115
311	In the second group sickness less prevalent, but mortality higher than in 1868	116
312	The results in third group much more unfavorable than in 1868	116
313	The results of the fourth group are less satisfactory than in any of the previous three years ..	116
314	In the Punjab the sickness and mortality were greater than of late years	116
315	Great prevalence of fevers in 1869, especially in the third and fifth groups	117
316	Special instances of prevalence of, or exemption from, fever	117
317	Great part of the mortality from fevers in Punjab due to Rawul Pindee Jai	117
318	The fever in the Rawul Pindee Jail reported to be true typhus	118

Para.		Page.
319	The prisoners suffered much less from fever than the troops at the same stations	118
320	Dysentery and diarrhœa, though only slightly more prevalent, were much more fatal than in 1868	118
321	Respiratory diseases were in the same ratio as in 1868, but more fatal	119
322	Apoplexy was fatal beyond all precedent	119
323	New series of annual jail statistical forms adopted	119
324	Disparity in the amount of salt allowed to prisoners in different provinces	119

SECTION V.

GENERAL POPULATION.

325	Reports from local sanitary commissioners will be specially important owing to the great sickness of the year	121
326	Orders regarding registration of deaths	121
327	Orders regarding a uniform system of recording vaccinations	121
328	Importance of the local sanitary reports	122
329	Return of deaths among the general population of military cantonments	123

APPENDIX A.

DR. LEWIS' REPORT ON THE MICROSCOPIC OBJECTS FOUND IN CHOLERA EVACUATIONS, &c.

Page 125 *to* 178

The Table of Contents is prefixed to the Report.

APPENDIX B.

DR. BRYDEN'S STATISTICAL REPORT ON THE GENERAL ASPECTS OF EPIDEMIC CHOLERA IN 1869.

Page 179 *to* 239

The Table of Contents is prefixed to the Report.

APPENDIX C.

REVISED RULES REGARDING THE MEASURES TO BE ADOPTED ON THE OUTBREAK OF CHOLERA AMONGST BRITISH TROOPS.

Page 241 *to* 263

ANNUAL RETURNS OF THE EUROPEAN AND NATIVE ARMIES AND OF THE JAIL POPULATION OF THE BENGAL PRESIDENCY FOR THE YEAR 1869.

EUROPEAN TROOPS.

TABLE.

I.—Table showing the Sickness and Mortality among the European Troops serving in the Bengal Presidency during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

II.—Table showing the Sickness and Mortality among the European Troops serving in Bengal Proper during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

III.—Table showing the Sickness and Mortality among the European Troops serving in the Dinapore, Benares, Oude, and Cawnpore Districts during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

IV.—Table showing the Sickness and Mortality among the European Troops serving in the Meerut and Rohilcund Districts during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

V. Table showing the Sickness and Mortality among the European Troops serving in the Agra District and in Central India during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

VI.—Table showing the Sickness and Mortality among the European Troops serving in the Punjab during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

VII.—Comparative Statement of the Ratios of Sickness and Mortality among the European Troops serving in the various Provinces of the Bengal Presidency during the Year 1869.

VIII.—Table showing the General Statistics of Sickness and Mortality in the principal Military Stations of the Bengal Presidency.

IX.—Table showing the ratio in which the principal diseases have contributed to make up the Admission-rate of the year in the chief Military Stations of the Bengal Presidency.

X.—Table showing the prevalence of Small-pox in each Month, and the Distribution of the disease by Stations and Provinces.

XI.—Table showing the prevalence of Cholera in each Month, and the Distribution of the disease by Stations and Provinces.

XII.—Table showing the Mortality in each Station, the Causes of Death, and the Ratio of Deaths to Strength.

XIII.—Table showing in detail the Causes of Death and Invaliding.

XIV.—Statement showing the Gain and Loss of the Regiments of the Army of Bengal in strength during the Year.

XV.—Distribution of the European Army of the Bengal Presidency on 2nd July 1869.

XVI.—Abstract of the Returns showing the Admissions, Deaths, and Invaliding of each Regiment for the Year.

XVII.—Table showing the Sickness and Mortality among the Women of the European Regiments serving in the Bengal Presidency during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

XVIII.—Table showing the Sickness and Mortality among the Children of the European Regiments serving in the Bengal Presidency during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

XIX.—Table showing the Distribution by Stations of the Deaths of the Women of European Regiments.

XX.—Table showing the Distribution by Stations of the Deaths of the Children of European Regiments.

XXI.—Table showing the Distribution by Stations of the Cholera of the Women of European Regiments.

XXII.—Table showing the Distribution by Stations of the Cholera of the Children of European Regiments.

XXIII.—Detail of the Admissions and Deaths of the Women and Children of European Regiments.

NATIVE TROOPS.

TABLE.

I.—Table showing the Sickness and Mortality among the Native Troops serving in the Bengal Presidency during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

II.—Table showing the Sickness and Mortality among the Native Troops serving in Bengal Proper and in Assam during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

III.—Table showing the Sickness and Mortality among the Native Troops serving in the Dinapore, Benares, Oude, and Cawnpore Districts during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

IV.—Table showing the Sickness and Mortality among the Native Troops serving in the Meerut District and in Rohilcund during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

V.—Table showing the Sickness and Mortality among the Native Troops serving in the Agra District and in Central India during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

VI.—Table showing the Sickness and Mortality among the Native Troops serving in the Punjab during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

VII.—Comparative Statement of the Ratios of Sickness and Mortality among the Native Troops serving in the various Provinces of the Bengal Presidency during the Year 1869.

VIII.—Table showing the Sickness and Mortality among the Native Troops composing the Central India Irregular Force during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

IX.—Table showing the Sickness and Mortality among the Native Troops composing the Punjab Irregular Force during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

X. Statement showing the Daily Average Sick-rate of each Station in each Month.

XI. Statement showing the ratio in which the chief diseases have contributed to make up the Admission-rate of each Station.

XII. Table showing the Mortality in each Station, the Causes of Deaths, and the Ratio of Deaths to Strength.

XIII.—Table showing the prevalence of Cholera in each Month, and the Distribution of the disease by Stations and Provinces.

XIV. Abstract of the Returns showing the Admissions, Deaths, and Invaliding of each Regiment for the Year.

XV.—Table showing the Sickness and Mortality among the Regiments of the Madras Native Army serving in Stations of the Bengal Presidency during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

JAIL POPULATION.

I.—Table showing the Sickness and Mortality among the Jail Population of the Bengal Presidency during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

II.—Table showing the Sickness and Mortality among the Jail Population in Lower Bengal and in Assam during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

III.—Table showing the Sickness and Mortality among the Jail Population in the Dinapore, Benares, Oude, and Cawnpore Districts during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

IV.—Table showing the Sickness and Mortality among the Jail Population in Nagpore and Central India during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

V.—Table showing the Sickness and Mortality among the Jail Population in the Agra, Meerut, and Rohilcund Districts during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

VI.—Table showing the Sickness and Mortality among the Jail Population in the Punjab during the Year 1869, and the prevalence of the principal diseases in each Month of the Year.

VII.—Comparative Statement of the Ratios of Sickness and Mortality among the Jail Population of the various Provinces of the Bengal Presidency.

VIII.—Table showing the General Statistics of Sickness and Mortality in the Jails of the Bengal Presidency and the Average Daily Sick per cent. of Strength in each Month.

IX.—Table showing the ratio in which the principal diseases have contributed to make up the Admission-rate of the Year in the Jail Hospitals of the Bengal Presidency.

X. Table showing the prevalence of Cholera in each Month and the Distribution of the disease by Stations and Provinces.

XI.—Table showing the Mortality in each Jail, the Causes of Deaths, and the Ratio of Deaths to Strength.

XII. Detail of the Admissions and Deaths of the Jail Population of each Province.

SUMMARY OF THE ADMISSIONS AND DEATHS OF 1869.

Detail of the Admissions and Deaths of the European and Native Armies and Jail Population of the Bengal Presidency.

ANNUAL SANITARY REPORT FOR 1869.

SECTION I.

THE CHOLERA EPIDEMIC.

INTRODUCTION.

The epidemic was very widespread.

In 1869 cholera was widely spread over India. Re-appearing with increased virulence in the area over which it had prevailed in the year previous, it extended in all directions. To the west it covered Central India and Rajpootana, causing a very lamentable mortality among the people already suffering greatly from famine. To the north it occupied the province of Oudh and touched the margin of Rohilcund. In the north-westerly direction its strength was much diminished. The upper portion of the North-Western Provinces and the Punjab, as a whole, suffered much less than those portions of the country which have been already mentioned, but the city of Umritsur and the valley of Peshawur were notable exceptions. Taking also the provinces which lie to the east of the Delta of the Ganges, the epidemic covered a wide area—upwards in a north-easterly direction over Assam and downwards to the south-east over British Burmah.

The area covered by it is generally indicated in the annexed map.

2. The distribution of the disease during 1869, and the relation which this bears to the area occupied in the year previous, are shown in the annexed map. Here the darkest shade indicates the endemic province of cholera, the medium shade shows the portion of the country which suffered from it in 1868, and the lightest shade, those portions which were invaded in 1869. In examining the differently shaded areas, however, it must be remembered that they are intended to indicate facts in only a general way. It is impossible, for example, to say with accuracy what are the endemic limits of cholera. On this point opinions differ greatly, for while some would consider that this area, as here shown, is too extensive, others would have it more widely diffused. The very term "endemic," moreover, is differently applied by different observers. Without entering into any discussion on this point, it will suffice to state that the portion which is indicated as being the tract within which cholera may be regarded as endemic, is that in which the disease is more or less constantly present at all times, and where it is liable to appear at all seasons. In the same way the limits of the epidemic tracts are only roughly mapped out, for the data regarding the general population are not yet sufficiently precise and reliable to admit of the prevalence of the disease being accurately defined.

General statistics of cholera in 1869.

3. The extent to which cholera prevailed in each month of the year, among troops and prisoners at every station in this Presidency, is accurately known. How many persons were attacked with the disease among the general population of the country can never be ascertained. The Returns regarding them generally include the deaths only, and even these are confessedly inaccurate. Still imperfect, and to a great extent untrustworthy, they are

too valuable to be omitted, and the comparative distribution of the epidemic which they indicate may be accepted as not far from the truth, although the actual number of casualties entered in each district may be always incorrect. From the information derived from the different sources available, the total results regarding the cholera epidemic of 1869 may be thus summarized:—

Statement showing the general results of the Cholera Epidemic in the Bengal Presidency during the year 1869.

	Population.	No. of attacks from cholera.	No. of deaths from cholera.	Ratio of deaths per 1,000.
EUROPEAN TROOPS.				
Men	34,624	889	570	16·46
Women	3,602	94	59	16·38
Children	5,688	142	108	18·99
Native Troops*	58,017	615	376	6·48
Prisoners	61,998	913	387	6·24
GENERAL POPULATION.				
Bengal Proper		No Returns available.		
Central Provinces	7,018,078	......	55,897	7·9
The Berars	2,074,614	......	10,947	5·2
North-Western Provinces	29,588,653	......	68,691	2·32
Oudh	11,198,095	......	23,134	2·06
Punjab	17,418,865	......	9,258	0·53
British Burmah		No Returns received.		

Detailed information regarding troops and prisoners will be found in the Annual Tables.

4. More detailed information regarding the European and Native troops will be found in the general tables of the year, which show the number of attacks not only at each station, but also in each regiment. The deaths in each district, so far as they can be ascertained, will be given in a separate statement for each Province. Particular information regarding the towns and villages which chiefly suffered, and the causes to which either special virulence of attack or comparative exemption was due, is of the greatest importance, and in the series of questions which was issued to Civil Surgeons, special attention was drawn to these points; but although their reports in many instances have been very carefully prepared, the data are too imperfect to admit of any general history of the epidemic among the people being compiled from them. The facts recorded must be supplemented by the register of deaths in different parts of these districts, and by a local knowledge of the country. The Sanitary Commissioners in their different Provinces will collect valuable information on the general history of the epidemic, the causes which appeared to favor its spread, and the local circumstances under which it was most active. The results of such enquiries will be looked for with much interest as a very valuable portion of their annual reports for 1869. It is impossible satisfactorily to consider the history of any epidemic, as it affects only one portion of the community. It is only by collecting the facts regarding all sections, and from all parts of the country, that any correct estimate can be formed of them, or any accurate conclusions drawn as to what they teach. To this most important point I shall revert in a subsequent part of this report.

Details regarding the general population will be given by the Sanitary Commissioners in their different Provinces.

History of the epidemic will be confined chiefly to troops and prisoners.

5. The facts now to be recorded will thus refer chiefly to the troops, European and Native, and to the prisoners, mention being made of what occurred in the villages and in the cities and bazaars only in a general way, or as illustrating the history of the disease in a neighbouring cantonment. The different places will, as a rule, be considered in the order in which they stand in Dr. Bryden's Tables, military cantonments and prisons being taken

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* Including Irregulars and Madras troops serving in this Presidency.

in turn according to geographical position. I proposed to separate the history of the epidemic entirely from any opinions which may have been based upon it, and in order to carry out this method in the strictest manner, it was my intention to have placed all the well-ascertained facts in one chapter by themselves, leaving the conclusions which had been arrived at by the medical officers to be given afterwards; but this plan would have entailed constant reference from one portion of the report to another, and would thereby have proved inconvenient. While still strictly separating fact from mere opinion, I shall therefore summarize the history of the epidemic in each station, and at the same time state the views of the medical officers with regard to it whenever they refer to matters of importance. In this manner it will be more easy to examine their opinions and to decide how far they rest on a correct basis. I would observe, however, that, as a rule, medical officers have confined themselves in a great measure to a bare narration of events, and have avoided all discussion as to the causes of the disease. Their conclusions refer mainly to such questions as importation and the effect of water in disseminating the disease, with regard to which an expression of opinion had been asked for in reference to the facts which came under observation during the outbreak.

A summary will be given of the events at each station and jail.

Plan of the report.

6. The report will consist of three chapters. The first will contain a short summary of the circumstances connected with the appearance of cholera in each station and jail which was attacked, with a statement of the opinions expressed by medical officers as to the cause and progress of the disease. The second chapter will contain a general review of these opinions and the conclusions which may be deduced from them, not only as regards the circumstances which appear to favor the spread of cholera, but also as to the effect of any preventive measures which were adopted to stay its progress. In the third chapter the practical question will be discussed—What can be done to avert the spread of cholera, and what measures ought to be adopted for ensuring a more accurate knowledge of the disease.

Measures adopted to procure information.

7. These subjects embrace a very wide field of enquiry, and in endeavouring to collect information with regard to them, I have addressed all medical officers from whom assistance could be expected. Circular letters with full enquiries attached were forwarded to every surgeon and assistant surgeon in medical charge of any body of persons attacked, whether soldiers, European or Native, prisoners, or the general population of a district, and from many of them very full and interesting replies have been received. In some cases these have been supplemented by the administrative medical officers, through whose hands they passed; in other cases they have been commented on by commanding officers. The local Sanitary Commissioners have aided in communicating with the civil surgeons, and some of them have further assisted me by a general summary of the facts connected with the distribution of cholera throughout their provinces. As already stated, I do not propose at present to discuss at any length the facts connected with the appearance of cholera among the general population, but the reports of the civil surgeons have been of great value in the consideration of the general distribution of the disease. It would be impossible to narrate the history of an epidemic covering a vast area, and affecting so large a part of the population, without the co-operation of the many observers who are scattered over it, and who came into individual contact with the circumstances affecting the body of men under their immediate charge, and I have to express my thanks to the many who have given their willing assistance.

Tour through affected cantonments.

8. Under special instructions from the Government, I proceeded, in the middle of August, to visit the various cantonments and camps affected by the disease, and during my tour, which lasted with a short interval till the beginning of December, I inspected the stations of Subathoo, Allahabad,

Cawnpore, Lucknow, Fyzabad, Agra, Morar, and Peshawur, as well as camps in the neighbourhood of some of these places in which the troops had taken refuge. In the course of this tour, I took the opportunity of visiting the cantonments of Dugshaie, Kussowlie, Umballa, Rawul Pindee, Campbellpore, Sydun Baolee, Attock, and Meean Meer. In some of these, where I happened to be at a time when cholera was still to be feared, I consulted with the authorities as to the measures which ought to be promptly adopted should these fears unfortunately be realized. In others, which I did not see till after the epidemic had passed away, and which had escaped in a very unexpected manner, I enquired into the circumstances, in order to ascertain whether this immunity could in any way be satisfactorily explained.

Accompanied by Dr. T. R. Lewis.

During nearly the whole of this tour I was accompanied by Dr. T. R. Lewis, one of the two officers who had been specially deputed from the Army Medical School at Netley to make a special investigation into the origin of cholera, and who has carefully studied the latest scientific observations on the subject. Time did not admit of much microscopic work, but advantage was taken of the opportunity of examining into the nature and porosity of the various soils with a view of testing the opinions advanced by Professor Pettenkofer of Munich, and the results of these examinations appear in Dr. Lewis' report, copy of which will be found in the appendix.

Conciseness will be aimed at as far as possible.

9. The facts connected with a great cholera epidemic are so numerous, and the questions which arise out of a discussion of them so many and important, that this report must of necessity be of some length; but I shall endeavour by stating the history of the disease as concisely as possible, and by avoiding all matters of a purely theoretical nature, to render it as short as is consistent with clearness. My object will be to place on record such a narrative as shall be useful for future reference, and to discuss only such matters as have a practical bearing on the nature of the measures which ought to be adopted for the prevention of the disease. With this object in view, it will be advisable to confine the account of the movements made by different regiments and detachments to a brief statement, such as will be sufficient for discussing the advantages of such movements, without entering into the details of the various marches and countermarches which are almost unintelligible to the reader ignorant of the geography of the locality, and which are particularly perplexing even to those who are personally acquainted with what took place at the time.

Dr. Bryden will add a chapter on the general aspects of the epidemic.

10. The report will, as far as possible, be of a purely practical nature. Setting aside all theories, I shall not search for any particular series of facts in support of one opinion to the exclusion of others which seem to tell against it. My object will be to state the evidence as fairly as possible, and to leave any general deductions on disputed points to a time when it is hoped that our knowledge may be more accurate and more extensive. On the geographical distribution of the epidemic, Dr. Bryden will add a special chapter in continuation of his work which was submitted last year, and the value of which will, I feel sure, be more and more appreciated as events add new facts which can be tested by his general conclusions.

Statistics received of individual regiments and stations do not always correspond with the figures given in the Tables.

11. The statistics which have been received from individual regiments and stations do not always exactly correspond either as regard cases or deaths with the figures given in Dr. Bryden's Tables. Owing to the system which has been adopted of considering choleraic diarrhœa as a distinct disease, the same case has frequently been twice entered. In some instances, again, men who have been discharged as cured of cholera have died of the secondary fever. These errors have been eliminated by Dr. Bryden, and the measures which have been adopted to prevent their recurrence will be explained hereafter.

CHAPTER I.

HISTORY OF THE EPIDEMIC.

The history of the epidemic will be given geographically.

12. In narrating the history of the great epidemic of cholera in 1867, the Hurdwar fair was taken as the point from which its progress could be most conveniently traced. There was reason to believe that this large congregation of people had proved the focus in which the disease had commenced, and from which it appeared to radiate in certain directions following the track of the dispersing pilgrims, but in 1869 there is no particular place or gathering which can be taken in connection either with the origin or the spread of the cholera; and it will therefore be convenient to consider the facts connected with the outbreak of the past year in a geographical order, commencing with the Lower Provinces and then advancing to the west, the north and the north-west, the division adopted in Dr. Bryden's Tables being generally preserved.

Cholera in Lower Bengal.

There were singularly few cases among the European troops there.

13. Among the few European troops quartered in Lower Bengal, the results of 1869, so far as cholera is concerned, are extremely favorable. Out of a total strength of 2,412, including men, women and children, the admissions into hospital from this cause were only 4 and the deaths 2. If the men be taken alone, a comparison may be instituted between 1869 and the previous eight years; but as the figures for each year will appear in the ten-year Tables now in preparation, and can there be referred to more conveniently, it will be sufficient to state that the ratios both of admissions and deaths from cholera among European troops in this group during 1869 (1·6 and ·53 per 1,000) show a minimum both of prevalence and of mortality from this cause. In 1866, the most favorable year between 1860 and 1869, the admissions were 3·4 and the deaths 1·9 per 1,000.

The Native Troops in Bengal Proper suffered more severely.

14. In the Native garrison of Bengal Proper the results are not so favorable, the admissions having equalled 8·80 and the deaths 4·13 per 1,000; but it is to be observed that the stations at which the Native troops chiefly suffered were places where there were no European soldiers, such as Dacca, Shillong and Nowgong, in all of which, although there was no great prevalence of cholera, a considerable number of sepoys were attacked. The Returns of this group for 1868 were more favorable, but, excepting this year, the admissions and deaths from cholera among the Native Army in Bengal Proper were fewer than in any of the preceding eight years.

Cholera was less prevalent among the prisoners in Bengal Proper than usual.

15. Among the prisoners in Lower Bengal, the proportion of admissions from cholera in 1869 was 22·4 and the deaths 9·52 per 1,000. Although somewhat higher than in 1868, these ratios are smaller than in any of the other ten years preceding it. In Alipore, Rungpore, and Backergunge the disease was severe.

There are no Returns to show the extent of the disease among the general population of Bengal Proper.

16. How far cholera prevailed among the general population of Lower Bengal cannot be ascertained. The registration of deaths in these Provinces was only partially in force during 1869, and no Returns have been received to show the results even so far as they were recorded. Orders have, I understand, since been issued with a view to attain a more accurate record of the deaths in this part of the country, and bearing in mind the relation which the Delta of the Ganges is generally supposed to hold

to cholera, both as its home and as the quarter from which its invasions take place, the importance of having this registration rendered as accurate as possible can hardly be exaggerated.

Complete exemption of European garrison of Fort William.

17. In connection with the small extent to which cholera prevailed among British troops in Lower Bengal, the complete immunity from the disease which the European portion of the garrison of Fort William enjoyed is very remarkable, and bears striking testimony to the sanitary improvements, especially the increased attention to conservancy and a good water-supply, which have been effected of late years. The fact is all the more worthy of notice, because the Native Regiment in the Fort which was subject to less favorable sanitary conditions did not escape. From the report of the Calcutta Municipality for the year, it appears that the deaths from cholera among Hindoos and Mahomedans in the city equalled nearly ten, and those of Christians five, per 1,000 of the population.

The sanitary condition of Hazareebaugh unsatisfactory.

18. As the immediate object of the special enquiry into the cholera of 1869 was to obtain information regarding those places which lie within the area covered by the epidemic, no questions were sent to those stations which are situated within the endemic province of the disease; and as none of the places in this group to which questions were addressed suffered with any severity, and as the replies received do not generally contain any facts of importance, they do not require special notice. The only exception to this remark is the Military station of Hazareebaugh, where, although only one European was attacked, there is a point in connection with its sanitary condition which deserves attention. This station, although included by Dr. Bryden in the first group of jails, forms one of those of the second group as regards European and Native troops. It may for the present purpose be more conveniently taken with Lower Bengal. With the statistics of 1870 the various groups will be re-arranged, so as to show prisoners and troops, as far as possible, in the same area.

Great want of drainage.

The barracks are reported to be "not overcrowded, clean, airy and well situated," but the drainage is evidently most imperfect. "Water," remarks Dr. Corbett, "lies in many parts of the cantonments to the south and north, rendering the ground swampy and boggy; and one of the married barracks (No. 4) during the rains is hardly habitable. The house occupied by Lieutenant-Colonel Nicholson is in a perfect marsh. A fact will show the state of the drainage. This officer shot within 50 yards of and in his own compound in one day, this season, 7 brace of snipe. The house occupied by the Barrack Sergeant and private houses in that locality are filled with intermittent fever, from the situation and bad drainage. The natural drainage of the station is excellent, and, with ordinary artificial assistance, the health of the station can be very much improved indeed. In fact, if this station is decided on, the first thing to be done to render it one of the nicest and healthiest stations in India will be to drain it thoroughly."

Effect of impure water used by the Police.

19. During the temporary absence of the civil surgeon two cases of cholera, which occurred among the Police at Hazareebaugh, came under Dr. Corbett's observation. He found the drinking water they used was "most filthy." It was collected, to all appearance, from a hole in the ground into which all surface filth could be, and no doubt was, washed. The affected guard was removed into camp, and good water supplied, after which not a single case even of diarrhœa occurred. "To the unwholesome water, and to this only," writes Dr. Corbett, "I attribute the cause of this outbreak of cholera."

No communication discoverable at Hazareebaugh or Ranchee Jails to account for the appearance of the disease.

20. From the three jails at Hazareebaugh and the jail at Ranchee reports have been received. In all of them a few cases of cholera occurred, but in none of them could it be traced to communication with an infected quarter. The medical officer at Ranchee writes—"after careful enquiry nothing can be discovered that could show importation, but there

was constant communication between the jail and the bazaar and between the bazaar and the houses affected in one of the mohullas of the town." Here, between the 13th and 16th of March, six persons died of cholera. The first prisoner seized with cholera was attacked on the 20th of that month.

Cholera was more than usually prevalent in Assam.

21. In Assam cholera was more than usually prevalent during the past year. The general history of the epidemic has not been communicated, but a report by the Commissioner, dated the 15th July, copy of which was received from the Bengal Government, contains some interesting information on the subject of how far the appearance and spread of the disease in the province is to be attributed to the influx of emigrants from Bengal. On this point the opinions of the various district officers have been collected. These differ much, some of them being decidedly in favor of this view of the case, while others are as strongly opposed to it. The evidence generally is wanting in details, but the facts adduced by Dr. White and Dr. Meredith, and the opinions which they express on this important subject, are worthy of attention.

Dr. White's opinion is opposed to the idea that the disease is imported into Assam by Bengal Coolies.

22. The former, who is Civil Surgeon of Debrooghur, and in medical charge of the troops there, remarks—

"During the time (nearly eleven years) I have been here, I have only once known an instance in which the introduction of cholera could be attributed to the influx of imported laborers from Bengal, and that was so far back as July 1860, when the Government Steamer *Adjai* arrived here with a large number of immigrants who suffered from cholera on the passage, and many were ill from that disease. On arrival they all went to the Maijan Tea Factory, then the property of the late Mr. G. R. Barry, and from thence the outbreak which followed soon after could be distinctly traced. The epidemic was, however, at the time coming up the valley from Bengal, having raged for some time before at Gowalparah and Gowhatty, and it is a question whether the laborers per *Adjai* did more than accelerate its outbreak here by a few weeks, as it worked its way up by land, appearing in turn at Nowgong, Golaghat, and reaching Seebsaugor before any of the intermediate villages between here and the latter station were attacked.

"Owing to this introduction of the disease by immigrants, I for some time afterwards, and long before the legislation of 1865, inspected the steamers on arrival and prevented the landing of passengers suffering from cholera. In 1864, when the tea speculation was at its height, the number of laborers who arrived, amounting to upwards of 600 a month, was so great and nearly every steamer having cholera on board, it was found impracticable, and would have been inhuman, to prohibit their landing. I then observed that, although patients were removed actually suffering from cholera to the various factories in the neighbourhood, it was never communicated to the old coolies. So complete was this immunity from contagion that in 1866 and 1867, when acting as Debarkation Officer, I never once prohibited the removal of cholera patients from the steamer to the several tea gardens to which they were consigned. As I incurred no little responsibility in doing so, I followed up and watched the results attentively, and I never heard of an instance of any of the old laborers on the garden to which the cholera patients were taken being seized; at times some of the new party of coolies who disembarked in health would be attacked on arrival at the garden, but never any of the coolies who had been previously there.

"Being much interested in the matter, I from time to time in former years enquired from the medical officers of the Assam and Jorehaut Companies, the two other principal centres of immigration, and their experience was similar to mine, that cholera was never propagated by fresh arrivals to either Cinnamara or Nazirah. There have been epidemics at both those places, but they could not be traced to introduction by recently arrived coolies.

"As bearing on this subject, it is worthy of remark that the imported laborers are much more exempt from cholera after arrival here than the Natives of Assam. Dr. Meredith's statistics show that the mortality from cholera among them is comparatively very small. There is nothing more common in the months of May and June every year than to find cholera raging in the Assamese and Cacharee villages in the immediate vicinity of a tea factory, whilst not a case occurs in the Bengallee lines. This I have observed for years past, but at the present moment I may adduce that although cholera has been prevalent in various parts of this district, there has been none among the Bengallee immigrants. The villages adjoining the Khowang factory were more than decimated last month, yet not a case appeared among the Bengalees. The Doom Dooma Factory has escaped, although so close to the Tiphook Gohain's village. Mr. Shaw, of Tallup Factory, has not had a case among his imported laborers, although it lies midway between the Tiphook Gohain's village and Saikwah, and has daily communication with the latter place. It has been devastating for the past five weeks the villages situated all round the Nagaghoolic Factory; yet only two cases have been reported among the Bengallees of that factory and both recovered.

"I have only given this season's results, but I could multiply like instances from epidemics of former years. If cholera was introduced by imported laborers from Bengal, the natural inference is that the first to be attacked would be the Bengallee laborers on the tea estates; the actual facts are, however, all the other way, as I have shown that in many instances they are entirely exempt, and that when it does break out among them, it is never so destructive as among the Assamese. Since the universal epidemic which commenced in June 1860, and attacked all classes and races except Europeans, and raged in different parts of the province for eighteen months afterwards, I consider that there has been no outbreak of the disease which can be correctly designated *epidemic*. Since that time cholera has been to a great extent endemic in the district, and I believe the same applies to the other districts of the province. My records show that for the last eight years one or more cases of sporadic cholera occurred in this station almost every week with annual circumscribed outbreaks, chiefly occurring in the month of June, but occasionally in May, July, and August also. The history of these outbreaks is in every case the same. A case of sporadic cholera occurs in a village, the patient is placed in the smallest and closest apartment of the house, a large fire is lighted, and as many people, friends and relations of the sufferer, as the room will hold, assemble and squat round him, I believe for the purpose of doing poojah or praying. There is seldom or ever any attempt to administer remedies; the patient during this time is vomiting, defecating, and the fomites of the disease must necessarily be carried off by the inmates of the crowded room or huts. After three or four days five or six cases occur, and so on daily, until it runs throughout the whole village or villages to which the person first infected belonged. Its further progress is limited or circumscribed by the rude system of quarantine maintained by the Assamese. So soon as it is known that any considerable number of fatal cases have occurred in any particular village, all the other villages in the neighbourhood cut off all intercourse with it. Although they may have very near relatives living in it, they will not go near nor allow any person from the infected villages to enter theirs, and so rigidly is this enforced that I have known instances in which persons approaching a healthy village from one where cholera existed were badly assaulted."

Dr. Meredith believes that it is imported.

23. Dr. Meredith, Protector of Laborers, submits the following memorandum :—

"Steamer *Lahore* arrived at Dhunsiri Mookh Ghât on the 18th February, bringing imported laborers to Assam. There was cholera on board. A number of laborers were landed for the Central Assam Tea Estate; two of them died of cholera at the ghât the night of the day they were landed, the rest went on to Diffloo Factory. At the factory the disease appeared again among them, and nine more imported laborers died of it by the 4th of March. After this date no Bengalees have died of the disease; but the disease broke out among the Assamese local laborers, three of them died at the garden, and others suffering from the disease were conveyed to their houses in the villages lying near. The malady now broke out among the villages with fearful severity, and the death-rate has been deplorably heavy. According to my informant, the cattle have suffered as bad as the people. I am unable to state the extent to which the disease has spread among the native population. I visited Diffloo Factory on the 11th of March, and felt satisfied that the epidemic then raging among the villages in the neighbourhood was traceable to the disease prevalent on board and imported by the *Lahore*.

"The Steamer *Progress* landed fifty-four coolies for the Golaghat Tea Estate at Dhunsiri Mookh about the 28th February. There was cholera on board. The laborers went to the Ghiladaree garden; the disease appeared among them at once, and eighteen imported laborers died of it at the garden; but the majority of these were old acclimatized laborers, who, the manager informs me, caught the disease from the unmarried women of the new arrivals, whom they took in marriage when they came on the garden. The connection between the cholera at the garden and the disease on board the steamer appeared to me pretty conclusive. I am not able to state how far the disease has spread among the villages near Ghiladaree. There was no cholera at the garden before the arrival of the laborers described.

"The Moran Factory garden received a batch of laborers by the Steamer *Lahore* in February; five of the laborers died of cholera at the factory soon after their arrival. There had been no more cholera at the garden up to end of April when I visited the place. I cannot say whether the epidemic of cholera, which is reported to have been so severe among some of the villages of Khowang Mouzah, can be traced to this outbreak among the laborers brought to Moran from the *Lahore*. The distance between the places is not great.

"Several deaths have taken place among the imported laborers of the Assam Company, chiefly at Nazirah. The medical officer in charge gave it as his opinion that the disease was traceable to either the *Lahore* or the *Progress*, but the connection had not been fully established, or otherwise, at the time of my visit in April."

General statement of results in Bengal Proper imperfect.

24. As has been already stated, there are no returns to show how far cholera affected the people generally in Lower Bengal, but the statistics of the troops and prisoners at each station may be conveniently compared in the annexed statement.

Statement shewing the comparative prevalence of cholera among the Troops and Prisoners in Bengal Proper during the year 1869.

STATIONS.	EUROPEAN TROOPS MEN, WOMEN AND CHILDREN.			NATIVE TROOPS.			PRISONERS.			GENERAL POPULATION.		
	Average strength.	Number of cases.	Number of deaths.	Average strength.	Number of cases.	Number of deaths.	Average strength.	Number of cases.	Number of deaths.	Population.	Number of deaths.	Ratio of deaths per 1,000.
Fort William ...	1,110	...	...	620	4	3	No Jail.	...	...	No returns available.		
Alipore ...	...	...	...	797	5	2	2,450	104	33			
Dum-Dum ...	635	2	...	420	1	1	No Jail.	...	...			
Barrackpore ...	535	1	1	826	2	1	......	...	...			
Baraset ...	...	...	...	...	...	...	204	1	...			
Jessore ...	...	...	...	...	...	...	726	...	...			
Kishnaghur ...	...	...	...	...	...	...	415	2	...			
Moorshedabad (Berhampore) ...	132	1	1	147	...	...	186	...	...			
Howrah ...	...	...	...	...	...	...	133	...	...			
Hooghly ...	...	...	...	...	...	...	526	10	4			
Serampore ...	...	...	...	...	...	...	42	2	1			
Burdwan ...	...	...	...	...	...	...	311	...	...			
Bancoorah ...	...	...	...	...	...	...	422	...	...			
Purulea ...	...	...	...	...	...	...	187	...	...			
Raneegunge ...	...	...	...	..	...	...	36	7	4			
Sooree ...	...	...	...	...	...	...	217	...	...			
Rajmehal and Pakour...	...	...	...	...	...	...	101	...	...			
Deoghur and Sub-division ...	...	...	...	...	...	...	118	...	...			
Malda ...	...	...	...	...	...	...	93	13	5			
Dinagepore ...	...	...	...	...	...	...	408	2	1			
Rajshahye ...	...	...	...	...	...	...	490	1	...			
Rungpore ...	...	...	...	...	...	...	391	53	20			
Bograh ...	...	...	...	...	...	...	158	5	4			
Mymensingh ...	...	...	...	...	...	...	527	3	1			
Pubna ...	...	...	...	...	...	...	180	3	2			
Furreedpore ...	...	...	...	...	...	...	342	...	...			
Backergunge ...	...	...	...	...	...	...	527	32	19			
Noacolly ...	...	...	...	...	...	...	249	...	...			
Chittagong ...	...	...	...	...	...	...	244	2	2			
Tipperah ...	...	...	...	...	...	...	346	2	1			
Dacca ...	...	...	...	331	13	7	468	7	1			
Sylhet ...	...	...	...	...	...	...	385	11	4			
Cachar ...	...	...	...	319	1	1	124	...	...			
Gowalparah ...	...	...	...	...	...	...	98	7	3			
Gowhatty ...	...	...	...	531	1	1	196	3	2			
Seebsagur ...	...	..	...	...	...	...	118	...	...			
Nowgong ...	...	...	...	86	19	8	61	12	4			
Tezpore ...	...	...	...	188	1	...	182	5	4			
Debroogurh ...	...	...	...	845	8	5	86	3	2			
Buxa ...	...	...	...	611	...	...	No Jail.	...	...			
Julpigoree ...	...	...	...	633	1	1	......	...	...			
Midnapore ...	...	...	...	...	...	...	723	13	4			
Balasore ...	...	...	...	...	...	...	160	4	1			
Cuttack ...	...	...	...	...	...	...	327	1	1			
Pooree ...	...	...	...	...	...	...	130	5	4			
Chyebassa ...	...	...	...	...	...	...	104	...	...			
Ranchee ...	...	...	...	...	...	...	312	6	4			
Hazareebagh ...	913	1	1	...	...	...	* 706	5	1			
							† 277	1	...			
Monghyr ...	...	...	...	...	...	...	356	...	...			
Bhaugulpore ...	...	...	...	468	...	...	299	8	5			
Purneah ...	...	...	...	...	...	...	310	2	1			

* Central Jail. † District Jail.

The area indicated in the second group of stations was severely attacked in 1869.

25. The second group contains thirty-eight stations lying chiefly in the valley of the Ganges, which are represented either by a body of troops or of prisoners and in some cases by both. Over great part of the area thus indicated cholera had been very prevalent in 1868, and over nearly the whole of it the disease reappeared in force in 1869. The general facts can be more clearly seen on referring to the statistics of the different sections of the community taken separately.

Many of the European troops in this group were attacked.

26. Omitting the station of Darjeeling which more properly belongs to the distinct group of hill stations to be considered separately, the average number of European soldiers in this area with their families equalled 10,778, and among these 344 were attacked and 251 of them died. The ratios of admissions and deaths from cholera alone were 31·91 and 23·28 per 1,000.

The native troops at these stations had few cases compared with the Europeans.

27. The native portion of the garrison of this part of the country escaped with comparatively little loss. Out of a total strength of 7,180 only 42 were attacked or 5·90 per 1,000 and only 19 died or 2·65 per 1,000. The comparative immunity enjoyed by the native soldiers, even when occupying the same cantonments in which the European portion of the garrison suffered severely, will be more particularly referred to in discussing the details of the epidemic at each of these places.

The epidemic among the prisoners in this group was severe only in a few jails.

28. Out of 20,172 prisoners immured within the several jails of this group, there were 341 cases of cholera, of which 129 were fatal. The admissions were in the proportion of 16·9 and the deaths of 6·40 per 1,000 of average strength. The severity of the epidemic was confined to a few jails. In many of them there were very few cases and a number escaped altogether.

The records of cholera among the people of this area are imperfect.

29. A few of the districts composing the area of this second group lie within the Government of the Lower Provinces, and here, as already explained, no data are available to show how far the disease prevailed among the people. There can be little doubt that the mortality from cholera among them was great. The districts of the North-Western Provinces and Oudh which are here concerned show a very wide spread epidemic. The figures are inaccurate, but the information which they afford is by no means valueless. It is to be observed in connection with all these registers that they refer to deaths only; the number of cases is not known, but if 50 per cent. be taken as a fair proportion of fatality the persons attacked may be roughly estimated by doubling the totals.

Facts of interest regarding the Gya jail.

30. The facts which have been collected from these numerous points of observation regarding the cholera of 1869 in this group, must now be examined in greater detail. In the Gya jail there were only seven cases of cholera during the year. No communication, direct or indirect, could be traced to account for them and they do not require any particular notice, but some interesting facts have been collected by Dr. C. M. Russell in his careful report and these deserve attention. "Gya," he remarks, "as is well known, is a celebrated place of pilgrimage, and a general idea has gained ground that the appearance and spread of cholera is connected in a great measure with the assemblage of the pilgrims in this town. This idea I believe to be an erroneous one and not borne out by facts. Indeed it is a remarkable circumstance that cholera prevails most in Gya just in those months in which the place is least visited by pilgrims." In illustration of this statement a Table* is given shewing the admissions from cholera into the jail hospital at Gya during the last 30 years, from which it appears that the maximum intensity of the disease has occurred in the months of July, August, June and May, in which pilgrims do not come

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* This Table shewing the results for 29 years, is printed in Dr. Russell's report as it appears in the Report of the Sanitary Commissioner for Bengal for 1868, p. 363.

in large numbers. "The arrangement and situation of the jail and its surroundings are highly insanitary," and these evils have been intensified during the past year by "overcrowding, intense heat, and the general distress." The price of food was very high, and the number of persons sentenced to imprisonment on account of petty offences was unusually large. The water is reported to be good and its contamination by cholera discharges "hardly possible."

The outbreak in Patna jail is believed to have been due to impure water.

31. In the Patna jail the disease was much more severe; there were 58 cases and 15 deaths. No communication could be traced between the cholera outside and that occurring within, but in the opinion of the Medical Officer its appearance was connected with an impure water supply. Fouling by sewage and especially by cholera discharges is believed to have been impossible, but "all sorts of impurities lodge in the water and give rise to the development of the lower forms of animal life." As regards the connection between this water and the cholera, Dr. Jackson writes—"There is the most positive evidence on this point. During the first epidemic I closed the wells and resorted to Ganges water, when the progress of the epidemic was at once stayed. Only one case occurred after I did this. Again on account of the expense of bringing it, river water was abandoned, and on the 1st September cholera again broke out. On the 1st of October I abandoned the use of well water again and up to the present time, nearly half the month having gone, only three cases of cholera have occurred." In the Deegah jail, which is under the charge of the same officer, only six cases occurred and none of them proved fatal. Here also no communication could be traced; the water is said to be good, and there is no reason to suspect that it was contaminated.

No such evidence at Deegah jail.

Cholera at Dinapore was chiefly among the native troops.

32. Not far from the Deegah prison and on the banks of the Ganges, lies the military station of Dinapore. Here among the European troops averaging 1,065 in number, there were 4 cases and 1 death. In none of them could any communication with an infected locality be traced. The native troops consisting of the 32nd Regiment Native Infantry suffered more severely, having had 15 cases of which five were fatal. The men lived in huts and were not provided with latrines. Four of the hospital establishment were attacked with cholera, but all recovered. The water supply is reported to be indifferent; it is drawn from an open well into which impurities may doubtless enter, but sewage could hardly find access.

No evidence of communication in Arrah, Chumparun, and Chuprah jails.

33. In the Arrah jail where there were 18 cases and six deaths from cholera; "no communication took place either directly or indirectly with persons affected outside." It appears however that "adjoining the jail there are several huts occupied by people who are only remarkable for their dirty habits," and that among them cases of cholera had occurred between April and July. The first case in the jail was on the 16th July. In the Chumparun jail also, where the first case occurred on the 15th July, and where 34 cases were treated of which 15 died, no communication could be traced between the jail and any infected locality. The sanitary condition of the place is reported to be good, the water is of tolerably good quality, and "it is quite impossible that it can have been contaminated by sewage or cholera discharges." No facts came to Dr. Sconce's notice to shew that the disease was spread by personal intercourse either directly or indirectly. From Mozufferpore jail, where 15 prisoners were attacked and six died, no replies have been received. In the Chuprah jail the disease was severe, 56 cases and 18 deaths having occurred. "There is no evidence," writes Dr. Macleod, "to support the supposition that the disease was communicated to the prisoner first attacked. The most careful enquiry at the time failed to establish any connection between the first case that occurred in the jail and the outside population." As regards the water he states.—"It is not possible that it was contaminated by

sewage or by cholera discharges;" nor is there the slightest evidence to show that it may have been the medium of spreading the disease.

Only a few cases occurred among the troops and prisoners at Benares.

34. The people in the district of Ghazeepore suffered severely, but the jail entirely escaped. The large central prison at Benares also preserved complete immunity and the smaller district jail had but two cases. One of the night-watchmen was attacked on the 29th July, and the first prisoner was seized on the 1st August. Dr. Hooper states, "the night-watchman had direct communication with this prisoner when counting and locking up prisoners on the night of the 28th." Cholera broke out in the Lunatic Asylum which is close by, before it appeared in the jail. Of this outbreak no particulars have been received, but the drainage of the asylum passes into the jail drains under the partition wall and cholera evacuations may have passed in them. Among the native troops also there were only two cases, and their appearance could not be accounted for. The sepoys live in sectional hut barracks. "Many of the men," remarks Dr. Perkins, "have been in constant communication with cholera-stricken villages, only a few hundred yards from the lines and in which their families lived, without importing the disease into the lines or suffering in their own persons." The three cases of cholera among the European soldiers at this station do not call for any special notice.

Sanitary defects at Chunar.

35. At Chunar which lies within a few miles of Benares, one European soldier was attacked out of the small garrison quartered there. A sepoy also who was taken ill on his way from Benares, died of cholera in the Garrison Hospital. The fort is situated on a highly elevated rock, it is clean and dry, and the men have good barracks with ample space and excellent ventilation. The neighbouring city of Chunar had suffered much from cholera, but no communication could be traced between the soldiers attacked and any case without. The sanitary condition of the vicinity of certain portions of this cantonment admits of improvement; in particular the existence of crowded native houses in immediate proximity to the Garrison Hospital is very objectionable.

A few cases there and in Mirzapore jail.

In the jail at Mirzapore which lies between Chunar and Allahabad, there were three cases, not traceable to human intercourse. The prisoners were overcrowded, and the superintendent expresses his surprise that they were not decimated by the disease. The water is good and free from contamination.

The epidemic in the Azimgurh jail.

36. In the Azimgurh district which lies to the north of Mirzapore, cholera was very prevalent and fatal, and the jail suffered considerably. The first case, however, did not occur till the 5th October. The disease had been common in the town close by from April till the middle of September, but no case had been reported among the outside population for seventeen days before the prisoner was attacked. The sanitary condition of the jail was generally good, but the inmates were overcrowded, because, owing to the hard times, there had been an unusual influx of prisoners. A certain number of them were moved into an empty barrack in the deserted cantonment with excellent effect. Dr. Sheppard frequently alludes to the unusual prevalence of easterly winds during the season. Early in October heavy rain fell, and by the 15th the river which had been gradually rising, flooded great part of the country.

Particulars regarding Jounpore and Goruckpore.

37. In the Jounpore jail where six cases of cholera occurred, of which two proved fatal, no evidence could be obtained to shew that the disease was in any way due to importation, or that it was connected with drinking impure water. Cholera entirely disappeared after a storm on the 15th August. At Goruckpore the disease was very prevalent in the city, but the native regiment entirely escaped. The wind blew generally from the east, and the Medical Officer in charge is of opinion that its position to the windward of the city was one reason why the cantonment escaped. Between the city and station there is a belt of trees which also may have afforded some protection. Quarantine was adopted

to prevent the access of the disease into cantonments, but as no particulars have been given, it is impossible to judge how far any good can properly be ascribed to this precaution. Throughout the district the people suffered much, especially in the months of July and August, and the epidemic was the most severe that has been known of late years. "It seemed to appear simultaneously in different parts of the district." "There is no evidence tending to prove that it was imported." On the 6th July the first prisoner was attacked, and before the epidemic ceased, there had been in all 74 cases and 34 deaths. No communication could be traced between the prisoner first attacked and any case outside. The sanitary condition of the jail itself has been generally good, but overcrowding existed at times, and "the sewage of part of the jail and a great portion of the city runs into large irregularly shaped dirty tanks." The water appears to have been of fair quality, and Dr. Prentis states that "it is very unlikely indeed that it could have been contaminated with sewage." Owing to the want of tents the prisoners could not be removed into camp, but 145 of them were placed in the police lines. "The disease seemed to be checked by moving from the infected barracks. This was particularly observable in the case of the female prisoners." Six of the prisoners attending on those ill with cholera were themselves seized, but considering the ratio of attacks among the general body of the prisoners in the jail, there is no evidence to show that personal intercourse was the means of spreading the disease.

The prisoners at Bustee, Gondah, and Baraitch escaped.

38. In the neighbouring district of Bustee, cholera seems to have been less prevalent, and here the jail entirely escaped. In the Gondah District, where it was more rife, no cases occurred in the jail. The Civil Surgeon remarks that the disease does not appear to have taken any special direction in its progress over this district, although he is inclined to believe that it was connected with the Dabee Patun Fair which did not conclude until towards the end of March, and on the 2nd of April the first case of cholera was reported among the inhabitants. No facts are, however, adduced in support of this opinion. Proceeding upwards to the north-west and skirting the foot of the Himalaya, we come to the district of Baraitch. Here the epidemic was comparatively mild. The Medical Officer believes that it was spread by pilgrims from the great fair at Ajoodhia, but no details are given. In the jail only one prisoner was attacked, and he recovered.

The European Troops in Fyzabad Cantonment were attacked.

39. At Fyzabad, in addition to a civil station, there is a military cantonment, and here the European Troops suffered somewhat severely. A few cases also occurred among the prisoners. The native regiment which formed part of the garrison escaped. In the district the disease, although persistent, was not very severe. As regards the jail, where three prisoners were seized, Dr. Selous writes, "I cannot, after the most careful enquiry, find any evidence to show that the disease among the prisoners was due to importation." The general sanitary condition of the prison was excellent; the water good and not subject to pollution. On the 6th of August, the first European Soldier, a man of the 1-11th Regiment, was attacked. There was no evidence to show that the disease had been contracted by communication with any infected locality. The drainage and other sanitary arrangements of the station are reported good. The well-water used for drinking was excellent, and its contamination with sewage or cholera discharges quite impossible. In the 1-11th Regiment there were 22 cases, of which 16 were fatal. Dr. Tulloch's excellent report is well worthy of attention. He writes, "when the second case occurred in the regiment (this happened to be in the same barrack as the first), the barrack was at once vacated, and the men encamped in a tope of trees east of the parade-ground. In this manner as barracks were attacked, they were emptied, until it became evident that the disease had fixed itself on the line of buildings occupied by the right wing, when the whole wing was moved into camp on the 10th August at 7 P. M. On the march one man was taken ill, and next morning another was seized, both of whom died." After this no case

occurred in camp except one of a doubtful character. On return to cantonments in the end of the month another man was seized. The results of this move Dr. Tulloch considers to have been excellent, not only in arresting the cholera but also as regards the general health of the men which improved with the change; so much so that no regular hospital was opened for the wing in camp. As regards the importance of immediately vacating any building in which a case of cholera occurs, he observes that there was some delay in vacating the hospital, but that no reasons such as weighed with him on this occasion would again induce him to hesitate as to the course to pursue. It is worthy of notice that in the epidemic from which the European Regiment at Fyzabad, the 26th Cameronians, has been suffering during the current year, the hospital has again supplied a greater number of cases than any other building, and had it been promptly vacated some lives would probably have been saved. In the E. Battery, 8th Brigade, Royal Artillery, during 1869 there were six cases and four deaths. A short move of part of the men was also made in this case with excellent results in every respect.

Roy Bareilly was attacked slightly. Neighbouring district jails escaped.

40. At Roy Bareilly the depôt of the 55th Regiment, the only military force in the station, escaped. In the jail there were seven cases and three deaths. Between the prisoner first attacked and any case outside no communication could be traced. The jail was overcrowded. The water used for drinking is of inferior quality, but could hardly have been contaminated by sewage. Within a few hours after the appearance of the first case, but not before seven in all had occurred, 100 prisoners were moved into camp with the best effects. In the jails of the neighbouring districts of Sultanpore, Pertabghur, Hurdui, and Kheree, the prisoners did not suffer at all.

Cholera in Lucknow. There were only two cases among prisoners.

41. The garrison at Lucknow, and especially the European portion of it suffered, very severely from cholera. Of 122 cases occurring in British Corps, men, women and children, 97 were fatal; of Native Soldiers only three were attacked, and all died. In the District Jail there were no cases and in the large Central Prison only two. There was a little overcrowding, but the general sanitary conditions under which the prisoners lived were excellent. The water was good and not subject to contamination.

There were only three among the Native Troops.

42. The number of cases occurring among the Native Soldiers, although averaging a strength of 1,767, was so small that they do not require any special remark. It will be necessary, however, to examine carefully the circumstances attending the outbreak among the British Troops. The European Garrison consisted of two corps of infantry, one of cavalry with three batteries of artillery, and among them there were 122 cases and 97 deaths.

The European Troops suffered much.

43. In the 102nd Regiment the first case is reported to have occurred on the 28th July. The drainage of the lines they occupied is defective. Between the 28th July and 19th August there were 23 admissions and 20 deaths. As cases occurred, the affected quarter was vacated and the inmates moved into tents close by. The surgeon of the regiment expresses no opinion as to the results of this plan, but from the information which I obtained when at Lucknow it appeared to have been successful, and Dr. A. Smith, the Officiating Deputy Inspector General, at whose suggestion it had been carried out, was decidedly of this opinion. In the 62nd Regiment the first person seized was a boy, who was attacked on the 29th July. The drainage of that portion of the station occupied by this corps is reported by the Medical Officer to have been very unsatisfactory. The regiment landed in Bombay only in the previous February. One case of cholera occurred among them at Deolalee soon after their arrival, three at Jubbulpore on their way up-country, and another in the train between Jubbulpore and Allahabad. In March there had been a case of "Choleraic Diarrhœa," and a boy had died of cholera in June. The regiment contained a very large proportion of young men; 127

were under 20 years of age, and 506 were under 25. This corps moved into camp, but the moves were not made with the promptitude which is desirable. Many of the buildings were not evacuated until a number of cases had occurred in each. The Medical Officer expresses his opinion that no benefit resulted from going into camp. Between the 29th July and the 28th August 74 cases occurred and 58 deaths. In the Royal Artillery the first case was on the 7th August. In all seven cases only were treated, of which three were fatal. Affected buildings were vacated, but there was not sufficient evidence to show how far the results had been thereby affected.

Especially the 62nd Regiment.

In the 5th Lancers several cases are mentioned tending to show the communicability of the disease.

44. In the 5th Lancers no case occurred till the 16th August. With reference to the probable cause of the outbreak, Dr. Atkinson states—"The sister of the cook of the family in which the first case occurred died of cholera two days before; he nursed her until her death, and then went back to his work." Buildings in which cases occurred were vacated, and the inmates removed to camp on the parade-ground. The Medical Officer is of opinion that this movement "stopped the disease." As illustrations of the manner in which it may have been spread, he observes that in addition to the case of the cook already mentioned, "one child was attacked the morning after finding a native lying across the door suffering from cholera. In a third case an infant was attacked whose mother was attending another of her children suffering from cholera." A man was attacked in hospital after being a short time in a tent with two suspicious cases, one of which afterwards proved to be cholera; one hospital sweeper was attacked and died. In this regiment there were 13 cases and 9 deaths.

Mucheo Bhawun Fort.

45. In the Muchee Bhawun Fort, which is near the cantonment of Lucknow and close beside the city, the first man seized was Kawn?, Private of the 62nd, who was part of the Infantry Detachment on duty at the fort, and he was attacked, as already mentioned, on the 29th July. Measures had been taken to prevent the men from straying into the neighbouring city and bazaars, as cholera was known to prevail in them, and Dr. Knipe is of opinion that the man in question had not been exposed to contagion. The drinking water was good and believed to be pure. The barracks were vacated after five cases appeared in them, and four more followed in the camp which was formed within the fort. The move was believed to have produced an excellent effect.

Contrast between the extent of cholera among the European Troops and the small number of cases in the city of Lucknow.

46. The contrast between the prevalence of cholera among the European Soldiers at Lucknow and the comparative exemption which was enjoyed by the native part of the garrison are very striking. It is also remarkable that the inhabitants of the large city of Lucknow situated close by, suffered very little from the disease. Among British Soldiers and their families averaging 3,107, there were in all 122 cases and 97 deaths, the mortality thus equalling 31·21 per 1,000. In the city only 173 deaths were registered as having been due to cholera, out of a population of 270,000, or a ratio of ·64 per 1,000.

Seetapore was attacked slightly.

47. The Civil Surgeon of Seetapore states that cholera "arose at the Neemsar Fair in that district, at which about 200,000 people, it is estimated, were assembled, and it spread in different directions among the bathers returning to their homes and among the people with whom they came in contact on their return home." In support of this statement no detailed facts are recorded. The disease was more prevalent in the station than in most parts of the district. The battery of artillery entirely escaped, but the regiment of European Infantry and of Native Cavalry suffered as well as the prisoners in the jail. Among the latter there were four cases, but regarding them no report has been received. In the 17th Bengal Cavalry also there were only three cases, but among the followers the disease was more prevalent.

The first case occurred on the 25th April. On the 29th a soldier's wife of the 60th Rifles was attacked. In all, ten cases occurred in this regiment, of which seven were fatal. The room in which any person was attacked was immediately vacated and disinfected, and the inmates removed to tents under trees in the vicinity. The Medical Officer is of opinion that the abandonment of infected quarters in this manner had an effect in checking the disease. The sanitary condition of the station is reported to be satisfactory and the water good.

Nawabgunge Jail escaped.

48. The Nawabgunge Jail escaped, but the people of the district generally suffered to a considerable degree. There was no evidence of human intercourse having been the means of spreading the disease, though in one village it appears to have been imported. The water is in many places of inferior quality, and there is one mode in which the wells may readily become contaminated with cholera discharges, which is mentioned by the Civil Surgeon, and which may prove a very probable method of polluting them. He observes, "the vessels used for carrying water to cholera patients are also used for drawing water from the wells. These vessels may be seen lying on clothing or on the ground saturated with cholera discharges and thereafter carried to the well with little or no previous cleaning. Clothing also belonging to cholera patients is washed on the platforms around wells, and is capable of conveying the discharges into wells, as a portion of the washings invariably finds its way back into them."

A few cases in Oonao.

49. In the Oonao Jail six cases occurred, the first having appeared on the 4th August. No communication with an infected locality could be traced to account for the attack, but the prisoner in question had been working on the roads and was therefore more exposed than ordinary to any infection. The jail was overcrowded, but otherwise in a good sanitary condition.

Only two cases of cholera among the Native Troops at Cawnpore.

50. Although cholera was very prevalent in the district of Cawnpore, the jail was altogether free from the disease. Among the Native Garrison also consisting of two regiments there were only two cases. The Medical Officer of the Native Cavalry remarks.—"The only man attacked in the 6th Bengal Cavalry was married. His wife and children lived in the Sudder Bazaar, and he to all intents and purposes lived with them. He was thus a resident in the Sudder Bazaar (where cases had occurred), and must be supposed to have contracted the disease there." Regarding the one case among the men of the 10th Regiment Native Infantry no explanation can be given. One officer of this regiment was also attacked and died.

Three cases in the wing of the 19th Hussars.

51. In the left wing of the 19th Hussars stationed at Cawnpore, the two first cases occurred on the 17th June. No communication, direct or indirect, could be traced between the affected persons and any other case of cholera. Two other cases followed, all being from the same troop. There were "no facts to prove that the disease has been spread by personal intercourse either directly or indirectly." Diarrhœa was very prevalent in the corps and continued so for some time. Infected buildings were vacated and disinfected, but no movement into camp was required.

Five cases in the Royal Artillery.

52. The Royal Artillery suffered more severely. The first case occurred on the 19th July. In all, five persons were attacked and four of them died. The occupants of one barrack, in which two cases had occurred, moved into camp about eight miles from the station, and remained free from the disease, but, as Dr. Giraud remarks, "no very correct estimate can be formed, as to the influence of this particular movement in checking the disease, inasmuch as the portion of the battery numbering 106 men, 11 women, and 12 children, who were left behind in cantonments, and who had suffered equally with those who went into camp, enjoyed an equal immunity

ity from the disease." Other diseases were not increased by being in camp; the men were pleased at the move, and were in excellent spirits. The medical officer could discover no evidence to show that cholera had been imported, or that it had spread by personal intercourse.

Twenty-one cases in the 1st Battalion, 14th Foot.

53. In the 1st Battalion of the 14th Foot, the first man who suffered from the disease was attacked on the 20th July, and his wife was seized about the same time. No evidence could be adduced to explain the occurrence of these cases. Whenever a case appeared, the affected quarter was at once vacated and fumigated. Several movements were made by this regiment on account of cholera. One detachment was conveyed by rail to Bhowpore and then on to Ripore; another moved to Panda-nuddee, on the Humeerpore road, and a third party was under canvas in the cantonment. The medical officer in charge of the regiment is of opinion that these movements served to check the disease, but venereal disease and dysentery were both, he believes, increased thereby. Altogether there were 21 cases in the regiment and 12 deaths.

Cholera at Allahabad.—In the city the disease was more or less prevalent from January to September.

54. In the Bandah Jail one solitary case occurred. Among the Native troops, a Madras regiment, two men were attacked, and both recovered. Passing by Futtehpore, where the jail altogether escaped, and where the particulars regarding cholera among the general population do not call for any special comment, we come to the important civil and military station of Allahabad, where the European troops, and, especially, Her Majesty's 58th Regiment, suffered greatly from the disease. Regarding the appearance of cholera in the city of Allahabad, which lies close to the cantonments, some interesting details have been furnished by the Civil Surgeon, Dr. Irving. He writes:—"Five deaths from cholera were registered in the city in September 1858. There were no deaths from cholera in October, but there were three in November and two in December 1868. The three fatal cases that occurred in November were Bengalee pilgrims who had come from Benares, where cholera was said to be prevalent. They were attacked in the railway carriage between Mogul Seraie and Allahabad. Two died on the 28th, and one on the 30th. In January 1869 there were two deaths from cholera registered in the city. One death occurred on the 12th, in the Khulasee lines, regarding which nothing is known. The second was a man named Bai Sing, who died in the Colvin Dispensary an hour after admission on the 19th January. He was brought by the Railway Police, who had taken him out of one of the railway carriages in a moribund state. He came from Benares. Three deaths were registered in February, and eight in March, from which date the disease has continued up to the present time (27th September), though now almost gone." During these nine months, 527 deaths from cholera were registered in the city. Although the facts connected with the Bengalee pilgrims would appear at first sight to show that the disease was imported, Dr. Irving states that after careful enquiries, he failed to obtain any evidence in favor of this opinion —"no subsequent cases appeared in any way to be connected with them."

In the civil station and among Railway servants, there were only 22 cases between April and September.

55. In the civil station during the same period, there were 22 deaths from cholera among European and Eurasian residents, the attacks being spread over the period from the 8th April to the 5th September. The servants of the East Indian Railway Company at Allahabad form a considerable community, living in barracks not far from the railway station, and particulars regarding them are, therefore, of special interest and importance. Their number, including Europeans and East Indians, was 350 men, 175 women, and 100 children, or a total of 625. Between the 30th July and the 28th August, these dates representing the days on which the first and last cases occurred, seven persons were attacked, and six of them died. Some of the bed-rooms are on the upper, and others on the lower, floor; but Dr. Irving states that "the upper-storied houses have been in occupation too short a time to enable me to compare the health of those living above and below."

56. The following statistics regarding the Europeans employed by the railway at Allahabad, which have been supplied by Dr. Irving, are valuable as showing the extent to which cholera has appeared among a community more resembling British soldiers than perhaps any other body of men in India, but subject to very different conditions as regards constant exposure and employment:—

Statistics of cholera among railway employés at Allahabad, 1859—1869.

TABLE showing the number of Admissions and Deaths from Cholera among Railway Europeans (Male) at Allahabad from January 1859 *to September* 1869.

Year.	Average Strength.	Jan.		Feb.		March.		April.		May.		June.		July.		August.		Sept.		Oct.		Nov.		Dec.		Total.		Remarks.
		Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	
1859	130	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1860	142	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	1	1	
1861	159	...	...	...	...	...	...	...	...	...	...	...	...	2	2	...	...	...	...	1	1	...	...	...	...	3	3	
1862	225	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1863	255	...	...	...	...	...	...	2	2	1	1	1	...	2	2	...	...	...	...	...	...	...	...	...	...	6	5	
1864	381	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1865	323	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	1	1	
1866	308	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1867	310	...	...	...	...	...	...	...	...	...	...	1	...	...	...	3	...	...	...	...	...	...	...	1	1	5	1	
1868	327	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	...	...	...	...	...	...	...	...	...	2	1	
1869	328	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	3	...	...	...	...	...	...	...	...	4	3	
Total ...	253	...	...	...	...	...	...	2	2	1	1	2	...	5	5	8	3	2	2	1	1	...	...	1	1	22	15	

Remarkable immunity of the Railway men as compared with British soldiers at Allahabad.

57. These statistics present a remarkable contrast to the experience of the European troops at Allahabad during the same period. They show that during 11 years the loss from cholera among Railway men equalled 59·25, or an annual average of 5·38 per 1,000. During 1869 alone the ratio of deaths from cholera among British soldiers in the cantonment was no less than 98·98 per 1,000, or nearly double in one year what it was among the Railway men during 11 years. With the exception of 1862 the European garrison of Allahabad has suffered more or less every year from cholera since 1859. In that year the loss was 51, and in 1863, 41 per 1,000 from that disease alone. In these three years 1859, 1863, and 1869, the loss in the British garrison of Allahabad from cholera amounted to nearly 200 per 1,000.

Nineteen prisoners attacked the in district jail.

58. In the large Central Prison which is separated from the civil station, cantonment, and city of Allahabad by a distance of from two to three miles, and lies on the opposite bank of the Jumna, there was not a single case of cholera, but in the district jail which is close to the city, 19 prisoners were attacked and 7 of them died. The prisoner first seized was a woman, who had not been beyond the jail gate for upwards of eight years. Recent admissions had taken place into the same ward, but no evidence could be obtained to show that the disease had been imported. It had been prevailing among the outside population in the immediate vicinity. The sanitary condition of the jail itself is reported to have been satisfactory, but "it is girt on almost every side by the abodes of the native population living and dead," and its position is most objectionable. The water used by the prisoners was good, and its contamination by cholera discharges "barely possible." In the case of this jail quarantine was impracticable, the fresh additions from without having been so numerous. In the month of July alone, on the 18th of which the first case of cholera appeared, 242 prisoners were received from amongst the outside population.

In the Central Prison efficient quarantine was enforced, and there were no cases.

59. In the case of the Central Prison however, Dr. Richardson reports that owing to its favorable position a really efficient quarantine was kept. Cholera here also appeared in the vicinity, but did not gain access within.

Sixteen cases in the two Native Regiments.

60. In the 11th Bengal Cavalry which occupied lines at Papamhow about a mile from the other portions of the cantonment, only one trooper was attacked. He was seized on the 7th August; between the 15th June and 15th August there were seven cases among the camp-followers. In the 4th Regiment, Native Infantry, the disease showed itself much earlier. On the 17th April, a portion of the corps moved into camp, and the medical officer, Dr. Wilson, is of opinion that the movement had a beneficial effect. In all 15 sepoys were attacked, of whom 7 died.

Twelve cases in the Royal Artillery.

61. In the Royal Artillery, the first case appeared on the 23rd April. D. Battery, 16th Brigade, which had suffered most, moved into camp; but the other Battery 4-24th and the head quarters of this Brigade did not leave cantonments. In all there were twelve cases of cholera and nine deaths in the Artillery. Regarding the D-16th Royal Artillery, further particulars are given by Dr. Doake. Leaving the infected locality, he believes, had a good effect. Five cases had occurred before they moved into camp, and the disease ceased after the second move.

In the 58th Regiment the epidemic was severe.

62. The 58th Regiment suffered from cholera with great and long continued severity. From the 11th June to the 22nd July there was a lull, but with this exception there were attacks almost daily between the 22nd March and the 14th August. It is worthy of notice that on the 22nd February a solitary case appeared; a man belonging to the 107th, but temporarily attached to the 58th, had been attacked

when on duty with the detachment in the fort. The interval from the 11th of June to the 22nd July marks the separation between what Dr. Bryden has called the spring and the monsoon cholera. When the disease ceased for a time, Dr. Lundy writes, "the epidemic was supposed to be at an end." But the experience of former years showed how fallacious any such anticipation must prove; as was to be expected, cholera re-appeared with greater severity than before. During their long time of suffering, this Regiment made numerous moves, sometimes from one set of lines to another; at others detachments were sent into camp at varying distances from the cantonments and in different directions. Early in August the Regiment moved by rail about 60 miles in the direction of Jubbulpore, and remained in camp at Onchadeck and Burgurh until they finally returned to cantonments on the 23rd and 24th September. From the first outbreak of cholera in March up to the time of the complete disappearance of the disease in the middle of September, 31 different moves were made. For a time the new barracks were occupied, but as fresh cases occurred, they were again abandoned for camp. There is not evidence, however, sufficient to form any opinion of the amount of protection which they might have afforded had they been occupied from the commencement of the year. The families who lived in them in the latter part of the season remained singularly free of the disease during that time. In Dr. Lundy's opinion the movements were beneficial. "In all moves the disease was checked."

63. The number of admissions and deaths from cholera in the 58th Foot is thus given by Dr. Ambrose in his very interesting and complete history of the epidemic as it affected his Regiment:—

In this Regiment there were 133 cases and 91 deaths.

		Strength.	*Cases.*	*Deaths.*
Officers	...	20	0	0
Non-Commissioned Officers and men		729	104	73
Women	...	68	9	5
Children	..	142	20	13
Total	...	959	133	91

The Wing from Darjeeling and the recruits from England suffered much more than the Wing which had been at Benares.

64. For three years previous to arriving at Allahabad on the 12th January 1869, the 58th Regiment had been separated into two wings, the head quarter wing having been at Darjeeling and the left wing at Benares. The health of the former had been excellent, and as regards both sickness, mortality, and invaliding, the results had been most favorable especially when compared with those of the other wing occupying the station in the plains. It is very remarkable that during the epidemic the right wing suffered much more severely from cholera than the left wing. From the annexed table which was prepared by the Regimental authorities and submitted to the Government, it will be seen that the admissions and deaths from cholera were in the one more than double what they were in the other. The draft recently arrived from England suffered also much more severely than the Benares wing. And the difference, it is to be remarked, is not confined to cholera. As regards fevers, dysentery, apoplexy, and venereal disease there is the same marked discrepancy. It is difficult to account for these results, and no satisfactory explanation of them has been given. The facts are deserving of record for future reference and investigation in connection with any similar data which may hereafter be obtained under like circumstances.

HER MAJESTY'S 58TH REGIMENT.

Comparative Statement of sickness and mortality in the above Regiment since the meeting of the Head Quarters and Right Wing from Darjeeling, the Left Wing from Benares, and the Draft from England, at Allahabad on the 12th January 1869, recording each party separately, up to and for the 23rd August 1869.

Distribution.	Strength.	Cholera.		Fever.		Rheumatism.		Diarrhœa or Dysentery.		Apoplexy.		Paralysis.		Small-pox.		Erysipelas.		Hepatitis.		Heart Disease.		Dyspepsia.		Anæmia.		Influenza.		Bronchitis.		Debility.		Venereal.		Other Diseases.		Total.	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Head Qrts. and Right Wing.	337	63	46	132	1	15	...	105	2	7	4	...	...	4	1	2	1	8	...	2	1	22	...	12	...	1	...	3	...	5	.	102	...	107	1	590	57
Left Wing...	332	24	16	53	...	13	...	53	3	3	1	2	1	1		...	...	21	1	2	1	13	...	10	...	...	...	...	...	4	...	47	...	73	1	319	42
Draft ...	96	15	11	45	2	1	...	25	...	3	3	...	...	1	.	...	...	1	..	..	...	3	...	5	...	...	...	1	.	...	.	3	...	24	...	127	16
Total ...	765	102	73	230	3	29	...	183	5	13	8	2	1	6	1	2	1	30	1	4	2	38	...	27	...	1	..	4	..	9		152	.	204	2	1036	97

The opinion of the Medical Officers at Allahabad is opposed to the idea that the disease was spread by human intercourse.

65. In the case of no one of the different sections of the community who were attacked at Allahabad has any evidence been adduced to show that cholera had been due to importation. In answer to the question, whether any facts had come to notice, tending to show that the disease had been spread by personal intercourse, either directly or indirectly, Dr. Irving states—"No such facts have come to my notice." Dr. Richardson, Superintendent of the Jail, observes—"I cannot fix on any facts tending clearly

to show this." Dr. Dempster, R. A., says—"None whatever. Personal intercourse did not appear to have influenced the spread of the disease in any way." Dr. Lundy, Her Majesty's 58th Regiment, leaves this question unanswered.

A special Committee was appointed to report on the sanitary condition of Allahabad. Its recommendations.

66. In connection with this severe epidemic, a special Committee was assembled to enquire into the sanitary condition of Allahabad. After a careful investigation conducted on the spot, and after the examination of many witnesses, they have reported that the drainage is defective; that the conservancy arrangements are very indifferent; that the water-supply is good, but that, as regards the new barracks, it is insufficient. They have recommended that a systematic scheme of drainage should be undertaken, and that it should embrace the city, as well as the whole settlement; that, in the city, this should provide only for the rain-fall and refuse water, but that in the new cantonments, it should carry off not only the waste water, but the sewage of the latrines; that with a view to provide for this scheme, and also supply water in sufficient quantity to the new cantonment, a deep well, fitted with a steam-pump, should be sanctioned, such as is already used by the Railway Company. Points of minor importance also received attention.

Comparison of cases among troops, prisoners, and the general population in this second group.

67. In the annexed statement the comparative prevalence of the disease among the troops, the prisoners, and the general population in the various districts and stations embraced within this second group can be conveniently compared:—

Statement showing the prevalence of Cholera among Troops, Prisoners, and General Population over the area embraced in the second group of stations.

STATIONS.	European Troops, Men, Women, and Children.			Native Troops.			Prisoners.			General Population.		
	Average Strength.	No. of cases.	No. of deaths.	Average Strength.	No. of cases.	No. of deaths.	Average Strength.	No. of cases.	No. of deaths.	Population.	No. of deaths.	Ratio of deaths per 1,000.
Gyah ...	...	...	...	...	...	...	490	7	3	No returns.		
Dinapore ...	1,065	4	1	532	15	5	......	...	...			
Patna ...	...	...	...	...	...	...	438	58	15			
Deegah ...	...	...	...	...	...	...	776	6	...			
Arrah ...	...	...	...	...	...	...	398	18	6			
Chumparun ...	...	...	...	...	...	...	260	34	15			
Segowlie ...	...	...	...	306	...	...	.....	...	...			
Mozufferpore ...	...	...	...	...	...	...	310	15	6			
Chuprah ...	...	...	...	...	...	...	269	56	18			
Ghazeepore ...	...	...	...	...	...	...	552	...	...	1,332,403	9,768	8·1
Benares ...	906	3	2	569	2	1	*1,157	...	...	798,277	3,527	4·4
Ditto ...	...	...	...	...	...	...	†544	2	2			
Chunar ...	60	1	...	64	1	1						
Mirzapore ...	...	...	...	...	...	...	271	3	...	1,054,413	4,855	4·5
Azimgurh ...	...	...	...	...	...	...	446	14	8	1,385,872	8,816	6·3
Jounpore ...	...	...	...	...	...	...	317	6	2	1,015,427	2,863	2·8
Goruckpore ...	...	...	...	667	...	...	706	74	34	1,983,816	8,593	4·3
Bustee ...	...	...	...	...	...	...	130	...	...	1,455,697	4,349	3·0
Gondah ...	...	...	...	...	..	...	654	...	...	1,167,816	3,554	3·04
Baraitch ...	...	...	...	...	...	...	176	1	...	774,437	1,274	1·65
Fyzabad ...	1,072	28	20	686	...	...	1,180	3	1	1,437,009	2,376	1·65
Roy Bareilly ...	237	...	...	...	...	...	322	7	3	782,874	4,779	6.10
Sultanpore ...	...	...	...	...	...	...	472	...	...	930,023	2,255	2·42
Pertabghur ...	...	...	...	...	...	...	181	...	...	936,053	1,762	1·88
Hurdui ...	...	...	...	...	...	...	314	...	...	930,977	339	0·36
Kheree ...	...	...	...	...	...	...	238	...	...	737,732	71	0·10
Lucknow ...	3,107	122	97	1,767	3	3	*1,715	2	2	697,499	658	0·94
Ditto ...	...	...	...	...	...	...	†1,110	...	...	273,126	173	0·62
Seetapore ...	703	10	7	427	3	1	1,008	4	1	930,224	2,018	2·17
Nawabgunge ...	...	...	...	...	...	...	105	...	...	875,376	1,272	1·45
Oonao ...	...	...	...	...	...	...	243	6	1	724,949	2,603	3·59
Humeerpore ...	...	...	...	...	...	...	192	...	...	520,941	2,059	3·9
Oraie or Jaloun ...	...	...	...	...	...	...	174	2	2	405,272	2,578	6·4
Cawnpore ...	1,310	27	17	987	2	1	412	...	...	1,188,862	2,798	2·4
Futtehpore ...	...	...	...	...	...	...	271	...	...	680,786	1,300	1·4
Banda ...	...	...	...	...	...	...	414	1	1	724,372	1,393	1·9
Allahabad ...	1,141	148	106	901	15	7	*1,833	...	...	1,393,183	2,864	2·1
Ditto ...	...	...	...	...	...	...	†543	19	7			
Nagode ...	...	...	...	146	...	...	116	3	2			

Central Prison. † District Jail.

Remarkable immunity of the districts and stations comprised in the third group.

68. The portion of the country which may be described as lying between the 80° of longitude on the east, and the Jumna on the south and west, and as bounded on the north by the Himalaya enjoyed a very remarkable immunity from cholera. It comprises the stations forming the third group of the European and Native troops and the fourth group of the jails, omitting the Agra jail, which will be more conveniently taken with the military station of that name. With these places, Futtehghur and Etah may be considered both on account of their geographical position and their immunity from cholera. In the tract of country thus defined lie 16 districts, each district having a jail and a few of them also a military cantonment.

General results in this group as regards all sections of the community.

69. Out of the total European garrison in this area, numbering in all 5,361, men, women, and children included, there were only 26 cases of cholera and 17 deaths, and of these cases all but three took place at Meerut. Out of 5,560 Native soldiers, only 2 were attacked and none died; while among 8,000 prisoners there were only 12 cases and 10 deaths, 8 of the cases having appeared in Bareilly. As regards the general population, it is worthy of notice that all the districts, with the exception of Delhi, which belongs to the Punjab, appear in the first rank of Dr. Planck's comparative statement for the North-Western Provinces, as those in which cholera was least prevalent. This fact alone shows that although the registration is still very imperfect, it is by no means altogether worthless.

The district of Etah was almost free from the epidemic.

70. The district of Etah almost entirely escaped. The Civil Surgeon writes:—"There has been no cholera epidemic in this district during the year, but one sporadic case of the disease in a boy was admitted into the jail dispensary and proved fatal." The prisoners also escaped. The immunity which this portion of the country and other parts lying in its vicinity enjoyed is of great importance, and it will be again referred to in connection with the anticipations of the outbreak of 1869 among European troops, and the special measures which were proposed to meet it.

There were also very few cases in Futtehghur.

71. Among the small body of Native soldiers at Futtehghur, one case of cholera occurred, but the European detachment and the jails altogether escaped. If the figures given in the mortuary statistics of the North-Western Provinces be accepted as the standard of comparison, the district of Futtehghur also suffered very slightly. There was no suspicion of the disease having been imported.

Particulars in certain districts of this group.

72. In the 37th Regiment at Shahjehanpore two cases of cholera appeared, one on the 23rd March, and the other on the 3rd April, but neither of them proved fatal. In the district the Civil Surgeon reports that "it was confined to one or two widely separated parts." In Budaon the Civil Surgeon believes that "it was decidedly imported from Futtehghur which is directly south." At Bareilly there was one case among the European troops, but this the medical officer is of opinion cannot be fairly considered as cholera. The child attacked had partaken of unripe fruit. On the next day, the 15th August, he passed several watery stools, containing the seeds of guavas, and collapse rapidly set in. The district jail at Bareilly remained altogether free of the disease. In the central prison eight convicts were attacked and six died. The first was seized on the 14th September. Cases had occurred previously among the free population, but no importation into the jail could be traced. The water is good and could not have been contaminated. "The attack lasted eight days, and then disappeared as suddenly as it commenced." The Moradabad District suffered very slightly, and in the jail only two cases occurred—both in the month of April. Bijnour was almost entirely free, and the same may be said of Mozuffernuggur, Saharunpore, Deyrah, Delhi, and Boolundshuhur. In the districts of Allyghur and Muttra the disease was somewhat more prevalent, but it was

nowhere severe, and the prisoners in all of them escaped. In none of the few military stations which they contain were the troops attacked excepting Muttra, where the wife of an officer was seized so late as the 1st November.

Cases at Meerut were believed to have been due to importation.

73. In the cantonment of Meerut, as has been already stated, the disease was more prevalent, but there it was confined to the European soldiers: both the Native troops and prisoners altogether escaped. One of the jail warders was attacked on the 17th September. Her seizure was believed to have been due to visiting a bazaar in which the disease was prevalent. Of the cases occurring throughout the whole district of Meerut by far the greater number appeared in the city. Cholera was believed to have been imported. "There was no case in the district," writes Dr. Moir, "as far as is known, till the arrival at Ghazeeabad of a traveller by Railway, who was in the last stage of cholera. He was taken out of the train and died soon after. After this, cases appeared both at Ghazeeabad and Meerut." This arrival occurred about the 15th August. In illustration of the spread of the disease by personal intercourse with those affected, Dr. Moir states:—"It was found that the sweeper and compounder attached to the dispensary cholera hospital performed their duties to other patients besides, and four of these patients were seized with cholera and two died. This was carefully prevented, and no more attacks occurred. In one case an attendant on a cholera patient was seized with the disease and died. The Municipal Native Doctor employed in treating cholera was attacked with the disease and died."

Dr. Moir's opinion on the arrangements for treating residents of bazaars, &c., attacked.

74. Dr. Moir's remarks on the arrangements which are best for treating natives seized with cholera deserve consideration. He writes:—

"As to the prevention of the spread of cholera in a native city or large bazaars, I think it worse than useless to provide hospitals for cholera, and then issue orders to the police to take all cases of the disease to hospital. Such an order is wholly impracticable, and defeats itself; it conceals the disease and also furnishes the police with powerful means of oppression. It leads to the existence of a number of hidden centres of contagion, and thereby the spread of the disease is promoted. This is no *theory* of mine. I have seen the actual results of the order on several occasions. Natives hate going to hospital, and they conceal their illness in order to avoid being taken there; doubtless, too, the sick often thus suffer. There ought to be hospitals for the poor who have no homes, and for others Native doctors should be provided to visit from house to house, instructed to teach segregation and disinfection while treating the sick. This plan has the advantage of being practicable; the other plan, though beautiful in theory, which has been in force hitherto, and which still seems to be recommended by the authorities, medical and military, has the insuperable disadvantage that it is quite impracticable in populous native cities and large military bazaars, containing, as at Meerut, upwards of 25,000 people."

Cases of cholera among European troops at Meerut occurred late in the season.

75. Cholera appeared among the European troops at Meerut on the 6th September. The first case was in the 4th Hussars, but this Regiment suffered very slightly. Altogether two men and one woman in it were attacked. In the 105th Regiment the disease commenced with one attack on the 9th. Eight other cases followed, the last having been admitted on the 19th October. The Artillery were attacked on the 15th September. Between that date and the 28th of the same month five of them were seized. It is mentioned in some of these reports that the disease had been imported by a sepoy who arrived from Morar suffering from cholera, but the particulars are not stated. There is no evidence to show that the occurrence of the first case in any of the Regiments was due to communication with an infected locality, or that further cases which appeared could be traced to the effects of intercourse with previous cases. In the Royal Artillery a mehter of the hospital establishment in attendance on the first case on the 15th September was attacked on the 17th and died. The sanitary condition of the station is reported to be unsatisfactory. The drainage is defective and the bazaars which are large and numerous are dangerous localities. The sudder bazaar is, in reality, a town with a population of 25,000 inhabitants.

Statement illustrating the immunity of this third group.

76. The annexed statement well illustrates the immunity preserved over the tract of country embraced in this third group of stations :—

Statement showing the general immunity enjoyed by the Troops, the Prisoners, and the General Population in the third group.

STATIONS.	European Troops, Men, Women, and Children.			Native Troops.			Prisoners.			General Population.		
	Average Strength.	No. of cases.	No. of deaths.	Average Strength.	No. of cases.	No. of deaths.	Average Strength.	No. of cases.	No. of deaths.	Population.	No. of deaths.	Ratio of deaths per
Muttra ...	560	...	...	...	...	...	223	...	...	800,321	1,060	1·3
Etah	...	...	...	...	...	...	212	...	...	614,851	242	0·4
Futtehghur ...	264	...	...	164	1	...	821	...	...	915,943	325	0·3
Ditto District Jail	...	...	...	...	...	...	402	...	...	......		
Etawah ...	...	...	...	...	...	...	233	...	...	626,444	449	0·7
Mynpoorie ...	...	...	...	...	...	...	365	1	1	700,220	349	0·5
Allygurh ...	...	...	...	84	...	...	381	...	...	925,538	429	0·4
Boolundshuhur ...	...	...	...	...	...	...	155	...	...	800,481	155	0·2
Shahjehanpore ...	584	2	...	337	1	...	295	1	1	918,850	257	0·3
Bareilly ...	1,005	1	1	939	...	...	1,393	8	6	1,464,199	935	0·6
Budaon ...	...	...	...	...	...	...	394	...	...	889,810	1,141	1·3
Saharunpore ...	...	...	...	..	...	...	203	...	...	866,483	182	0·2
Roorkee ...	455	...	...	237	...	...		...	...	.....		
Bijnour ...	...	...	...	...	...	...	198	...	...	690,975	68	0·1
Deyrah ...	...	...	...	784	...	...	57	...	...	102,831	1	...
Mozuffernuggur ...	...	...	...	...	...	...	186	...	...	682,189	166	0·2
Moradabad ...	304	...	...	408	1	...	363	2	2	1,095,306	1,141	1·3
Meerut ...	1,916	23	16	970	...	...	1,257	...	...	1,199,593	565	0·4
Ditto District Jail...	...	...	...	...	...	...	371	...	...	....		...
Delhi ...	447	...	...	638	...	...	348	...	...	602,633	47	0·08

Great prevalence of cholera in the fourth group.

77. The results in the fourth group of stations present a very marked contrast to those which have just been considered. In the Central Provinces and in Central India, the parts of the country which are represented in this area, cholera was extremely prevalent and fatal. Among European troops occupying a few stations within it there were 320 attacks and 185 deaths out of a force which averaged only about one hundred above the strength of the British troops in the Meerut group. The Regular Native Army suffered to some extent especially at Morar, and the Irregular Regiments which occupy the stations of Central India had many cases of cholera. Among the prisoners 150 were attacked and 68 died. During the year 1867, the Central Provinces had been singularly free from cholera, and that, too, at a time when the disease was extremely prevalent in Upper India, but in 1868 they suffered much, and in 1869 the epidemic was most severe. In 1868 the deaths from cholera among the general population were reported to be under 10,000, in 1869 they were stated to be not far short of 56,000.

As it affected the general population.

78. The Sanitary Commissioner of the Central Provinces is of opinion that even this high figure understates the actual number of deaths that occurred from cholera among the people. His report of the epidemic, founded in great part on the facts elicited during his tour among those parts of the country which were chiefly attacked, is now in preparation, and I hope soon to be in possession of the general conclusions at which he has arrived. I understand that the facts which have come to his notice during the past year go far to support the views which he expressed in his interesting report for 1868, that the prevalence of the disease in any locality is dependent chiefly on the insufficiency and impurity of the water-supply of the locality which suffers, and that cholera is undoubtedly spread by human intercourse. On this latter point the opinions of the Civil Medical Officers in the Central Provinces vary greatly. In some cases the direct importation of the disease into the district is believed to have occurred beyond all question, and striking facts are cited in confirmation of this opinion. In others again, there is no evidence whatever of this nature, and the appearance of cholera at different and distant points at or about the same time would favor the opposite opinion.

Amongst the prisoners in the Central Provinces.

79. Only a few of the jails suffered from the disease with any severity. At Chanda and Bhandara, considering the small number of prisoners in each, the attacks were numerous. At Chanda it is said that the man first attacked was an under-trial prisoner, who had been in jail only two days, and had come from an infected locality, but neither here nor in any of the other jails did one of the attendants on the sick suffer, nor is any instance adduced in which the disease can be said to have been introduced by means of contagion. As regards the probability of contaminated water having been the medium of spreading the disease, testimony is universally borne to the fact that the water was of good quality and could hardly have been subject to any form of pollution.

Cholera at Jubbulpore. Epidemic among the general population.

80. In the Jubbulpore District cases of cholera were reported as early as February, and during the month of March the disease was undoubtedly among the people with some severity. The Civil Surgeon is of opinion that its introduction could have been traced were it not that the origin of the epidemic was masked by the prevalence at that time of a very fatal form of diarrhœa attended with vomiting and extreme prostration, which he attributes to the effects of the scarcity from which the population were to a great extent suffering. "Of all the persons," writes Dr. Rice, "Native doctors, compounders, vaccinators, sweepers, dooly-bearers, personal attendants, &c., who have been in close personal contact with cholera patients, only one was attacked—a Native doctor who was detached to Belputhar on account of a very virulent outbreak in a large body of coolies employed on the works of the Railway viaduct over the Nerbudda. I attribute his being attacked rather to the insanitary condition of the locality than to any contact with patients." In the city the disease was as its height in May.

There were 18 cases among the prisoners.

81. On the 11th of that month a prisoner was attacked—the first case that occurred in the jail. No communication could be traced between him and any of the communities which had been previously suffering from the disease. The water is reported to be good, and although the position of the well from which it is drawn is open to objection, there is no evidence to show that it contained any sewage impurities. Between the 11th May and the 9th October 18 cases occurred, and there were 13 deaths.

Among the troops the 2-12th Regiment was chiefly attacked.

82. The very few cases among the Native troops at Jubbulpore do not require any special notice. There were only four, of which two were fatal. In the very overcrowded state of the lines occupied by the 21st Madras Infantry, it is matter for surprise that the disease, notwithstanding all the precautions adopted, did not spread. In the Artillery there were only two cases and both died. The first was admitted on the 25th April and the second on the day following. The 2-12th Regiment had 13 cases and 10 deaths. "The first case was that of a corporal who had been in charge of the rest camp at Hoolkee on the Nagpore road; cholera had been prevalent all along this road as well as in the vicinity of Hoolkee during the greater part of March. The corporal came into the station on the 25th March, was placed in a tent about a mile from barracks, and was attacked on 1st April." The drainage of the station is reported to be "most defective; there are jheels and swampy ground all about, requiring thorough drainage." Only one detachment was moved into camp, and the change, Dr. Sinclair believes, had a good effect in every way.

Cholera was very severe at Saugor in the 1-7th Royal Fusiliers.

83. The European troops at Saugor suffered much more severely. The 1st Battalion of the 7th Royal Fusiliers was first attacked, a private of the regiment having been seized on the night of the 12th May. Two other cases rapidly followed. The Surgeon of the Regiment observes, "there seems no doubt that it was imported." The station was not in a satisfactory state, as regards sanitation, owing to the extensive building operations which were going on and which brought a number of people to the place, while the debris of ruined houses, &c., favored the concealment of deposited excreta. In spite

of the utmost care there is also reason to believe that much fœcal deposit takes place in the compounds of the houses of the station. Rapidly drying up in the hot weather, the presence of the nuisance is not discovered until the ensuing rains. The disease was very widely spread over the lines. "Only two of the barracks escaped," writes Dr. Hendley. "The disease appeared to attack individuals indiscriminately and took no regular course. The occupants of no particular buildings appeared to suffer more than others excepting in the case of the new hospital barracks." The water was good and the well could hardly have been contaminated by cholera discharges.

Unfavorable experience of moving into camp in this corps.

84. The occupants of one building (No. 1, New Hospital Barrack,) formed the only party which went into camp. They moved "to the parade ground on the 13th May, and on the 14th to Gumeereya, 2½ miles east of the station. Here they remained till the 17th, when being attacked with great virulence on the previous day they removed to Sikharree 2 miles south." After this they made two other short moves and returned to cantonments on the 28th May. The camping grounds are all to the eastward of the station, which the medical officer considers a disadvantage when cholera appears to be advancing from the eastward or is more virulent in that direction. The experience of this detachment was certainly very unfavorable. "Owing to some cause, which cannot be clearly explained, there can be no doubt that the detachment suffered very much more than they would have done had they remained in their barracks. At the first encamping ground they appear to have encountered some virulent morbific influence which caused great mortality, and although they were removed immediately and the influence there considerably weakened, it appeared to follow them in the next two moves." This detachment numbering 120 had the first case on the 12th May, and another occurred among them before they could evacuate the building (No. 1, New Hospital Barrack,) on the next day. After leaving it 22 cases and 11 deaths occurred among them, *viz.*, 11 on the 16th, 6 on the 17th, 4 on the 18th, and 1 on the 22nd. While they were suffering so much in camp, the strength of the battalion left in cantonments was 644, and among them during this time there were only four cases, three in the persons of men who had been out to camp on duty and one a woman. None of the attendants on the sick were attacked. The only instances of apparent communication of the disease through personal intercourse were those of a woman who attended on her child and of a man who attended on his comrade. From the 28th May to the 28th July there were no cases, but then the disease reappeared and continued with little intermission up to the 2nd September. Altogether there were 60 admissions and 37 deaths from cholera in this Regiment, including men, women, and children.

The Royal Artillery were not attacked till later, and suffered much less.

85. In the first epidemic the Royal Artillery altogether escaped, and it was not till the 28th July, the day on which the Royal Fusiliers were attacked for the second time, that one of them was seized. Cases occurred in each of the four barrack-rooms occupied by the Royal Artillery, in No. 34 block of married quarters and in No. 6 cottage, but it is worth remarking that "13 cottages inhabited by married people escaped and the block of building (35) the Staff Sergeant's quarters." In two cases affected buildings were vacated, but no movement was made into camp. "It is recorded that a child in good health was taken by its mother to see the body of her sister who had died of cholera. This child sickened and died of the disease a few hours afterwards. The case was regarded by the Officer in medical charge of the Royal Artillery during the outbreak of cholera as having been contracted by personal intercourse." There were 14 cases and 10 deaths in the two batteries.

Nine prisoners attacked. General population suffered much.

86. The Madras Cavalry Regiment, stationed at Saugor, altogether escaped, and in the 40th Madras Infantry there were only two cases. In the jail the first occurred on the 15th June. The man was working in the garden. The next persons attacked were two of the prisoners who had accompanied this man's body to the place of burial, but they had neither touched the body nor the cot on which it was carried. The nine prisoners attacked all came

from two barracks; there was no overcrowding and all the barracks are constructed on the same principle. The water was pure and wholesome, and any contamination of it by either sewage or cholera discharges "in the highest degree improbable, nay impossible under any combination of circumstances." Among the people generally the disease was severe. In the city it made its appearance on the 3rd May; on the 9th some ten cases occurred amongst the coolies employed in the immediate neighbourhood of the new European Barracks. The first case among the Europeans, which, as we have seen, appeared on the 12th May, was admitted from the building in the immediate vicinity of the spot where these coolies were working and had been attacked. Communication could be traced between this gang and the village of Chittora, some ten miles distant from Saugor, in which cholera had been previously prevailing. The year was unusually hot, water was scarce, and the high rate of provisions pressed heavily on the poorer classes.

The Lullutpore District and Jail.

87. In Lullutpore which lies to the north of Saugor there are no European troops. In the small detachment of Native soldiers quartered there no case occurred, but in the jail there were 13 cases and 7 deaths. The first prisoner was attacked on the 1st April and the second on the 12th June. The barracks were overcrowded owing to the unusual influx of prisoners consequent on the scarcity of food and the large number of persons who were convicted of petty offences due to this cause. Although the disease was believed to be due to importation, there was no evidence to show that this had really been the case. The water was good and free from contamination. Among the general population the disease prevailed to a great extent. In the comparative table given by the Sanitary Commissioner, Lullutpore appears as the district of the North-Western Provinces which suffered most.

Nine cases at Nowgong in the detachment of the 2-12th Foot.

88. The 7th Bengal Cavalry at Nowgong altogether escaped. Among the Native Infantry there were but three cases, none of which proved fatal. The European garrison at this station consisted of a detachment of the 2-12th Regiment, the head quarters of which were at Jubbulpore: among them there were nine cases and six deaths. Dr. McLean, the Assistant Surgeon in medical charge, reports that the first man attacked was seized on the 5th June. There is no native city in the neighbourhood, but cases had occurred in some of the surrounding villages for about a fortnight previously. There was, however, no evidence that the disease had been brought into cantonments from any of these infected quarters. The occupants of one of the barracks attacked moved into camp. The move is reported to have probably had some effect in checking the disease, but the weather was very wet at the time, and a good many cases of diarrhœa and dysentery followed the exposure. The hospital nurse was attacked, but this was the only case which at all favored the idea that the disease was spread by contagion.

In Jhansie Cantonments there were 57 cases in the 93rd Highlanders, but only 9 deaths.

89. In Jhansie also the people suffered much from cholera. Among the prisoners there were but two cases. Cholera had been prevalent in the city for sometime before, and there was constant communication with the jail, but no certain proof could be adduced to show that the disease had been imported. In the 93rd Highlanders there were 57 cases, but they would appear to have been of a mild type, as only nine of them proved fatal. The first appeared on the 7th August. The water is derived from wells and is considered good. Detachments of the Regiment moved into camp and remained under canvass for about three weeks. The movement is believed to have had a decided effect in checking cholera; but an increase in fevers was ascribed to the exposure. A hospital cook was seized with cholera, but recovered. This was the only case which might be regarded as tending to prove the communicability of the disease, and how far this man had come in contact with the sick does not appear. In the Battery, Royal Artillery, the only one man who was attacked died. Diarrhœa was very prevalent. Of the Native soldiers only one was attacked.

Five cases in the detachment of the 93rd at Seepree.

90. In the detachment of the 93rd Regiment at Seepree, there were five cases, all of which proved fatal. The first occurred on the 29th July. . The disease had been prevalent among the surrounding native population for some time previous, but its importation into cantonments could not be traced. The Medical Officer, Dr. Murray, remarks, that the water which passes through the station in the nullah is the drainage of a part of the country where lie two villages, which had previously been visited by cholera in its most virulent form. Cholera discharges as well as great quantities of decomposed animal matter from the bodies of cattle which had died during the famine and had been left to lie on the ground without burial must have been carried down in the stream, and to this cause it is believed that the outbreak of the disease in the cantonments may be attributed. No less than 80 per cent. of the cattle in the district are reported to have died of starvation. Among the Native troops at Seepree there was only one admission and one death from cholera during the year.

Great prevalence in the Gwalior State.

91. In the Gwalior State the sufferings of the people were very great. In the earlier part of the season and chiefly in the month of May, the heat was intense, and the number of deaths from heat apoplexy among the Native population was very large and apparently unprecedented. Owing to the scarcity of provisions there was much distress; the poor people assembled in large numbers, and in the rage of hunger devoured all they could get, unripe and uncooked grain, &c., in immoderate quantities. It was from among them that cholera found its chief victims. In the "Lushkur" or native town adjoining the Fortress of Gwalior, and especially in its most crowded portions, it raged with great virulence.

The sufferings of the people from want and disease were extreme.

92. The sufferings of the people must indeed have been great. From a statement which was furnished by the durbar early in the current year, it appears that from the 6th June to October 1869, 3,853 persons are believed to have died of starvation and 89,136 of disease, chiefly heat apoplexy and cholera. It is estimated that nearly 400,000 cattle perished from want and heat during the same period. How far these returns are correct admits of some doubt; but the Political Agent is of opinion that the numbers are not exaggerated. In this calamity of drought, famine, and disease, whole families perished without notice or record. The number of deaths caused by heat apoplexy among Natives is a remarkable and most unusual feature of the year, and it will be seen hereafter in discussing the statistics of the Native troops and prisoners how unusually prevalent this disease was among them. Writing on the 14th September 1869, the Political Agent at Gwalior states :—"The deaths from heat apoplexy in the districts doubtless far exceeded those of the towns. From every direction came the same reports. *Scores* of travellers were found dead about the country, especially on the Agra and Bombay road, and agriculturists, cowherds, and other classes of people died in the fields. The approaches to cantonments were dotted with corpses. Death met the eye at every turn; flocks wandered for want of shepherds. It really seemed as if a plague was being bred, and in all the cases the suddenness of death was the great peculiarity. There was no stage of insensibility accompanied by sterterous breathing so distressing to witness ordinarily. There was no struggle for life. In most instances the wretched victims half delirious from the throbbing headache and burning skin, faint and laboring from a fearful thirst, staggered to the nearest stream or well, crying for "water," "water", but no sooner had they drunk copiously of what they believed to be the water of life than their system suddenly collapsed; they fainted and death released them from their sufferings."

72 cases among the Royal Artillery at Morar.

93. The first case of cholera among the troops in the cantonment of Morar occurred in the Royal Artillery on the 3rd April. No reliable evidence could be obtained to show that it was due to importation. Seizures continued almost daily till the end of May. During the months of June and July there was only one admission (on the 25th July), but early in August the disease reappeared and continued till the end of the month. Out of the three Batteries there were 72 cases and 38 deaths. C. Battery, 8th Brigade, suffered most severely, having had 44 cases and 22 deaths. The medical officer can assign no cause for this difference,

unless it be that "this Battery had been a shorter time in the country (2½ years) than the others." The disease was not confined to any particular buildings. The only barracks occupied by the Royal Artillery that escaped were two small bungalows used as staff married quarters, and they are reported to be "perhaps the closest, worst ventilated, and hottest buildings of any." When any case occurred the inmates of the infected room were removed from it. The medical officer states that "in every movement marked influence in checking the disease has been noticed." There was no increase of other forms of sickness. Four of the coolies in attendance at the hospital were attacked with cholera. A corporal employed in the Public Works Department was attended by a man of the C-8th Royal Artillery. The gunner was attacked next morning and died, the barracks in which he lived having been previously free from the disease. Dr. Murphy observes, that as usual in his experience, the first case of cholera appeared in the married quarters. The same fact was observed at Morar in the epidemic of 1868.

The disease in the 103rd Royal Bombay Fusiliers was very severe.

94. In the 103rd Royal Bombay Fusiliers the disease was also very severe. The first case among them occurred on the 22nd April, and two others followed on the same day. No direct communication could be traced in any of the three cases, but cholera had been prevalent in the sudder bazaar for some time, and the coolies employed by the Public Works Department in building barracks had also suffered. It is supposed that the disease was imported from the native city by the half-starved people, numbers of whom flocked in, seeking for relief or employment. The sanitary condition of the station was well cared for. Owing to the drought the water in the wells was scanty, but of good quality. In this Regiment there were altogether 75 admissions and 51 deaths. Five of the cases were in April, two in May, and one in June; the remainder occurred in July and August. Whenever a second case occurred in any building it was at once vacated and the occupants placed in tents. Numerous movements were made by different companies as they became affected. In Dr. Fishbourne's opinion, the results show that they had a most decided influence in checking the disease. As instances of cases in which intercourse with infected persons appears to have given rise to fresh seizures, it is stated that a woman attending her child when suffering from the disease herself died of it next day, and that six of the hospital attendants were attacked. An *ayah* in the service of a family in the fort went to the native city, where cholera was raging; shortly after her return she was attacked and died; the child whom she waited on was then seized and died, next the mother was attacked, and lastly, the medical officer who attended them all himself fell a victim. On the other hand, however, in all cases where women in the Regiment were attacked, their husbands were allowed to attend on them, and mothers nursed their sick children, and in one case only out of 23 was a husband or mother who attended cases seized.

Native troops suffered slightly.

95. Out of three Native Infantry Regiments quartered at Morar, there were only 23 cases of cholera and 18 deaths. In the 33rd Regiment Native Infantry there were ten cases and eight deaths. The first occurred on the 25th April, the second on the 12th June, and the remainder in August. In the 22nd Native Infantry the first attack was on the 4th May. Three other cases followed in the same month. During June and July the Regiment escaped, and then there were eight more seizures. Altogether twelve men were attacked with cholera and nine died.

The statement, that cholera had prevailed in former years on the site now occupied by Morar Cantonment, is unfounded.

96. Among other statements made in connection with the severe outbreak of cholera at Morar and the prevalence of the disease there since its occupation, it was asserted in more than one official report that the ground on which the station now stands was in former days the site of several villages which were ultimately abandoned by their inhabitants in consequence of the persistence and severity with which cholera appeared among them. The enquiries which I made during my visit to Morar satisfied me that this statement was incorrect, but as the point is of much importance, I applied to the Political Agent for further information. He was good enough to examine the patels of the villages which

were formerly on the ground now taken up by the station, and their stories show that the statement regarding the abandonment of any villages in this locality had not even a basis of fact. On the formation of the station the villagers were forced to move much against their will, and received compensation for the loss of their property.

Cholera in the fortress of Gwalior.

97. In the fortress of Gwalior the disease appeared on the 3rd May, when a woman of the Artillery was attacked. For some time previous it had been very fatal among the Native population in the neighbouring town of Gwalior and in the Lushkur. In all there were 13 cases and 9 deaths in the garrison. Affected buildings were vacated as cases occurred, but no move was made into camp. During the outbreak two of the hospital establishments were attacked. The Maharajah's army which is cantoned not far from the fortress suffered much, but no statistics are available to show the number of the attacks or of the deaths among them.

Very slight in the Agra Cantonment.

98. In the Agra Cantonment the disease was very slight,—only one case occurred among the European garrison. On the 1st July a woman of the Artillery was seized. In neither of the Batteries was diarrhœa prevalent, but between the 6th and 24th August the medical officer of the 77th Regiment observed a few cases of diarrhœa of a character such as are seen when cholera is about. "There was," says Dr. Hensman, "a tendency to greater prostration, considerable more trepidation in the person affected, tendency to vomiting and cramp in one or two cases, and the symptoms generally, although they yielded readily to simple treatment, impressed me with the belief that some extraordinary influence was at work, and that any one of these diarrhœa cases might terminate in true cholera." In the 40th Native Infantry there were eight cases and four deaths. The first occurred on the 30th May. In the 1st Regiment Native Infantry there were four cases and two deaths. The 40th moved into camp, but Dr. Elliott is uncertain whether the arrest of the epidemic can be justly ascribed to this movement.

Eleven cases among the prisoners at Agra.

99. In both the Central and District Jails at Agra a few prisoners were attacked. In the former the first case occurred on the 16th July. As the jail establishment, with few exceptions, live in the city and neighbouring villages where cholera was prevalent, it is difficult to say whether this case was due to importation or not. Up to the 2nd September, when the last case occurred, there had been 11 attacks and 4 deaths. In the District Jail there were only six cases, the first appearing on the 15th August, and five deaths. One of the hospital attendants was attacked. Dr. Moir remarks that the general health of the prisoners on admission was below the usual standard, and that this was, no doubt, due to the scarcity which had for some time past been felt among the people.

Cholera very severe in Rajpootana.

100. Throughout the various states of Rajpootana cholera prevailed. The people had been subjected to great privations on account of the famine, thousands had died of starvation, and the debilitated condition of the population made them prone to suffer from cholera and other diseases. There are no statistics to show even approximately how many deaths were due either to famine or other causes, but there is no question that the year was one of great distress, and that the mortality was very heavy. In his general report on the province, Dr. Moore remarks with reference to cholera, that "the general and almost simultaneous appearance of the malady over such an extensive area is altogether opposed to the theory of communication by human intercourse being the only means by which cholera is disseminated. In May and June the disease showed itself in many widely distant localities." On the other hand, numerous instances are given to show that cholera is conveyed along the great lines of road, and that an outbreak in several cases appeared to be due to importation of the disease. The general conclusions at which Dr. Moore arrives are "*first*, that human intercourse alone, or human intercourse with infected places, does not suffice to explain the irregular extension and dissemination of the disease, and *second*, that the disease may be extended by human intercourse."

Eleven cases in Ajmere and 35 in the Beawur Jail.

101. In the Ajmere Jail there were 11 cases and 3 deaths. There was no evidence of importation, the water was good, and its contamination by sewage not possible. In the Beawur Jail the first case occurred on the 10th May, and 11 more were admitted on that day. The disease would appear to have been of a mild type, as only 9 out of 35 cases were fatal. The jail was overcrowded owing to the number of petty thefts committed by persons in distress.

Cholera was very prevalent in Central India.

102. In Central India the epidemic was very prevalent and fatal. Allusion has already been made to the sufferings of the people in the Gwalior State, and in other parts of this country they were also very severe. The number of cases and deaths in the Irregular Force quartered over this area may be regarded as some index of the extent to which it attacked the population generally, especially when it is remembered that Native soldiers, as a rule, preserve a singular immunity from the disease. Out of a strength of 4,010 there were 63 cases and 31 deaths. In the city of Bhopal and also at Sehore cholera was both frequent and fatal. At Indore its ravages were very great. From Native States it is even more difficult to obtain reliable data than in our own territories, but there can be no doubt that cholera was widely spread over the whole of this portion of the country, and that it occasioned a very lamentable mortality.

Statement showing the prevalence of cholera over the area forming the fourth group.

103. The great prevalence of the disease in the different sections of the community occupying the area, indicated in the fourth group, so far as it can be ascertained, is shown in the following statement:—

Statement showing the prevalence of Cholera among the Troops, Prisoners, and the General Population in the fourth group.

Stations.	European Troops, Men, Women, and Children. Average Strength.	Number of cases.	Number of deaths.	Native Troops. Average Strength.	Number of cases.	Number of deaths.	Prisoners. Average Strength.	Number of cases.	Number of deaths.	General Population. Population.	Number of deaths.	Ratio of deaths per 1,000.	Remarks.
Raipore ...	No European Troops.			No Native Troops.			414	1	1	586,118	9,349	15·9	
Belaspore ...		Do.			Do.		88	4	3	530,541	9,220	17·3	
Bhandara ..		Do.			Do.		132	25	12	608,480	954	1·5	
Chanda ...		Do.			Do.		149	28	13	414,869	721	1·7	
Nagpore ...		Do.			Do.		820	1	...	558,119	1,292	2·3	
Chindwarrah ...		Do.			Do.		85	...	...	260,913	103	0·3	
Wurdah ..		Do.			Do.		45	...	...	176,228	1,759	9·9	
Sironcha ...		Do.			Do.		14	...	...	54,680	...	...	
Mundla ...		Do.			Do.		70	...	...	217,264	4,343	19·9	
Jubbulpore ..	809	15	12	770	4	2	851	18	13	539,106	4,684	8·6	
Dumoh ...	......	...	...	...	...	...	108	2	1	280,554	3,196	11·0	
Saugor ..	1,072	77	53	900	2	1	242	9	3	490,636	9,376	19·1	
Nursingpore ...	......	...	...	...	...	...	142	...	...	340,356	4,325	12·5	
Lullutpore ...	......	..	...	77	...	...	208	13	7	248,146	2,702	10·9	
Jhansie ...	769	57	9	619	1	1	264	2	2	857,774	1,794	5·0	
Seonee ...	No European Troops.			No Native Troops.			123	..	...	421,650	2,059	4·8	
Baitool ...		Do.			Do.		73	...	...	254,915	411	1·6	
Sehore ...		Do.			Do.		80	...	..	...	...	...	
Hoshungabad ...		Do.			Do.		299	1	1	427,056	2,379	5·5	
Nimar .		Do.			Do.		79	...	...	166,882	617	3·6	
Ajmere ...		Do.			Do.		398	11	3	..	...	...	
Beawur ..		Do.			Do.		111	35	9	...	...	...	
Agra ...	1,058	1	1	950	14	7	1,839	11	4	1,028,544	1,913	1·9	
Ditto District Jail ...	......	...	..	...	...	...	497	6	5				
Morar ...	1,349	156	99	1,410	23	18	No Return.			No Return.			
Gwalior ...				...	...	...							Independent States.
Seepree ...	157	5	5	245	1	1		Do.			Do.		
Nowgong ...	221	9	6	267 328	... 3	... 1		Do.			Do.		
Banda ...	No European Troops.			359	2	2		Do.			Do.		
Augur ...		Do.		228	4	3		Do.			Do.		
Goonah ...		Do.		330	5	3		Do.			Do.		
Bhopal ...		Do.		812	5	3		Do.			Do.		
Sirdarpore ...		Do.		380	10	7		Do.			Do.		
Kherwarrah & Kotrah		Do.		673	14	6		Do.			Do.		
Erinpoorah & Out-posts ...		Do.		869		4		Do.			Do.		
Deolee ...		Do.		197	...	...		Do.			Do.		
Deolee & Out-posts ...		Do.		717	0	5		Do.			Do.		

Cholera in the Punjab generally less severe than in 1867.

104. In the Punjab, the stations of which constitute the fifth group of Dr. Bryden's Tables, the epidemic, as a whole, was much less severe than it was in 1867. In that year 43,146 deaths from cholera were registered, whereas in the past year the number was only 9,258. The violence of the disease fell chiefly on a few places, such as Umritsur, Kohat, and Peshawur. A glance at the map will show that a great portion of the province escaped. The disease prevailed chiefly in the months of July, August, September, and October. The deaths from cholera reached their maximum at Umritsur in August, at Peshawur in September, and at Kohat in October. The general history of the disease throughout the year will be fully detailed by the Sanitary Commissioner of the Province, and illustrated by the annual mortuary statistics which he has prepared. To its appearance among the general population I shall not again refer, except in the case of those districts in which either the prisoners or the troops have suffered from it.

The prisoners as a body had few cases.

105. The prisoners as a body preserved a remarkable immunity from cholera. Out of an average strength of 12,381 only 43 cases occurred, of which 22 were fatal. The admission rate from cholera among them was only 3·5 and the death rate 1·78 per 1,000. Of the 29 jails only five suffered at all, and in three of these, Sirsa, the Lahore Female Jail, and Kohat, the disease was confined to one or at most two cases. At Umritsur, although the city within the walls of which the jail is situated suffered so severely, only seven prisoners were attacked, of whom six died. The most severe outbreak was at Peshawur, but the particulars of this and of the disease as it appeared in the Umritsur Jail will be considered in connection with what occurred among the troops at these places.

Native troops at certain stations were attacked with unusual violence.

106. Among the Native troops individual cases occurred at several stations. At Peshawur they suffered severely, 179 having been attacked, of whom 111 died. In consequence of this outbreak the admission rate from cholera for Native soldiers in the Punjab, as a whole, amounts to 12·1, and the death rate to 7·33 per 1,000. In the Punjab Irregular Force in the same way, owing almost entirely to the epidemic at Kohat, the admissions from cholera equalled 19·5, and the deaths 13·90 per 1,000.

High admission rate among European troops due almost entirely to the outbreak at Peshawur.

107. Among the European troops, quartered in the plains of this province, out of a strength of 13,253, including men, women, and children, 397 were attacked with cholera and 257 died. The admissions and deaths from this disease for the province were, respectively, 29·95 and 19·39 for the year. But a glance at the Table shows that these results, most unsatisfactory as they are, were due almost entirely to Peshawur, at which station out of a strength of 2,050 no less than 377 were attacked and 241 died.

Individual cases at certain stations.

108. The history of this severe outbreak and also of the disease as it attacked Umritsur, Nowshera, Kohat, and Bunnoo requires special attention, but before describing what occurred at these stations, the individual cases which were reported at certain other places deserve some notice. At Jullundur, two cases, and at Ferozepore, Sealkote, Mooltan, and Dera Ismail Khan solitary cases took place among the European troops. Those at Jullundur occurred one in May and the other in August, and both proved fatal. The first was that of the Drum Major who was admitted into hospital with cholera, passed through the stages of collapse and of secondary fever, and then succumbed to delirium tremens which followed. The second occurred on the 22nd August. It was an undoubted case of cholera and proved fatal in eleven hours. At Ferozepore a Corporal of the 5th Fusiliers was admitted on the 17th August "with vomiting, cramps, coldness of extremities, clammy perspiration, and sunken features." He sank rapidly and died. At Sealkote, on the 3rd June, an officer was seized with vomiting, purging, with cold breath, fingers shrivelled, and all the symptoms of cholera. His case appeared for a long time hopeless, but he ultimately recovered. At Mooltan a soldier of the 109th was attacked on the 26th June and recovered. At Dera Ismail Khan a suspicious case was

admitted into hospital on the 31st October; vomiting and diarrhœa were succeeded by insensibility, and the man died on the 4th November. Several of these cases were not reported as cholera at all. The symptoms under which the Corporal at Ferozepore labored and died were attributed to a recent debauch, followed by exposure to cold and night air. The officer at Sealkote was believed to be suffering from the effects of drinking cold water when he was heated. At Dera Ismail Khan the man was returned as having died of "asthenic apoplexy." But looking at the symptoms in each, and the position which these places occupy on the map, it is difficult to avoid the conclusion that these individual cases occurring on the margin of the epidemic area were but indices of the same influence which was at work in greater force within.

The outbreak in the city of Umritsur.

109. Umritsur suffered very severely from cholera. The town has a population of nearly 134,000 inhabitants, and of these 3,041 fell victims to the disease. Deaths from cholera were registered in all the early months of the year, with what accuracy it is difficult to say. On the 27th May a case regarding which there could be no doubt was seen and reported by the Civil Surgeon. The disease spread but slowly and was confined to no particular quarter of the town. During May 16 cases were registered, and during the whole of June there were only 38. In the early part of July the cases continued few, but on the 13th, 17th, and 27th of that month there was rain, and an increase in the numbers attacked followed. On the 16th August the outbreak was at its height—118 persons died on that day. Altogether in August there were 2,330 deaths from cholera. In September the number was 75, and in October only two. On the 8th of that month the last death occurred from the disease.

Report of special Committee.

110. By order of His Honor the Lieutenant-Governor of the Punjab, a special Committee, of which the Sanitary Commissioner of the Province, Dr. DeRenzy, was a member, assembled to enquire into the causes of this very lamentable mortality. The water-supply of the city they have reported to be dangerously impure. Although the history of the first case is obscure, the Committee consider it probable that cholera was introduced from the Eastern Provinces, where it was epidemic previous to the outbreak at Umritsur, and with which provinces there is now easy Railway communication. Besides the cleansing of the city wells and the underground drains, and other reforms of less importance, they have recommended measures for providing a pure water-supply and a scheme of sewerage. For the water works His Honor has directed that a plan and estimate be prepared, but before sanctioning any general scheme of sewerage, he is of opinion that the experiment should be tried in a single street of the city.

Seven cases among the prisoners.

111. Among the prisoners there were only seven cases, of which six were fatal. The jail, as has been already stated, is within the city walls, and any attempt at separation was therefore difficult. Quarantine was, however, carefully carried out as far as practicable, and no prisoner was allowed to work outside the precincts of the jail. The first man attacked had been in confinement for ten months. No communication could be traced which would account for his seizure. The water was of good quality; Dr. Taylor does not think it could have been contaminated by sewage, and as a precaution it was boiled and filtered before use. None of the attendants were attacked, and there was no evidence to show that the disease had been spread from man to man. It is worthy of notice that the prisoners were attacked between the 10th and 22nd of August just when the disease was at its height in the city. One move was made into camp, and the results were decidedly favorable.

Nine cases among the Europeans in the Fort of Govindghur.

112. In the Fort of Govindghur, which lies close to the city of Umritsur, there was a small European Garrison, numbering 125, including soldiers and their families. The force consisted of a Battery of Artillery and some men of the 92nd Highlanders. On the 6th August, the very time, it will be observed, when the disease was gaining strength in the city, an Artillery man was

attacked and soon died. No communication could be traced, and there was no evidence of importation. Another case followed on the 9th, two on the 12th, one on the 13th, and one on the 21st August. The other three occurred on the 2nd and 3rd September. No move was made into camp, but after the case on the 21st August half of the Battery was sent to the vacant cantonment barracks, a mile distant, and only one other case occurred amongst them. Altogether there were nine cases and six deaths. None of the hospital servants or attendants were seized. The Artillery had seven admissions, while the 92nd Highlanders out of a similar strength had only two, but no satisfactory reason can be assigned for the difference.

Cholera at Lahore believed to have been imported from Umritsur.

113. The epidemic passed lightly over the Lahore District. The city and the civil station suffered more than other parts. The first case is reported to have come by train from Umritsur on the 22nd July, and the first persons who were attacked in the city lived in the Sultan Serai, a part where travellers from all sides put up. Dr. Smith, the Civil Surgeon, has no doubt the disease was directly imported from Umritsur. In the city with a population of 85,000 inhabitants there were 184 and in the civil station 71 deaths from cholera. Among the victims was an American Missionary. A Native christian who attended him when ill was seized the day after his master died. On the evening of the same day the Native christian's wife was seized with cholera and died.

Sharp outbreak in the Lunatic Asylum.

114. The lunatics at Lahore suffered more severely than any other community at the place; out of an average strength of about 200, 44 of them were attacked, and 33 of those died of the disease. It commenced on the 5th September and lasted till the 29th. The first case occurred on the very day that the supply of drinking water which had hitherto been drawn from wells was taken from the canal. The canal water was believed to be purer, and was therefore recommended for use, but it is not a little remarkable that with the first supply from the new source the disease appeared. Dr. Neil who was in temporary charge of the institution believes that the cholera poison was introduced into the asylum by the canal water, and in this opinion Dr. Smith concurs. Dr. DeRenzy, the Sanitary Commissioner of the Province, dissents. He has pointed out that the establishment belonging to the asylum, to the number of 84, drew water from the same source as the lunatics and yet not one of them was attacked. The only difference in their case appeared to be, that they drank it before filtration, while the patients drank it after it had passed through a rude filter of which sand was a part. This sand, he found, had been obtained from a very objectionable locality where it might easily have been contaminated with impurities, and a fresh supply had been placed in the filters on the 4th September, the very day before the epidemic commenced. The occurrence of 23 cases between the 5th and 9th favors the idea that a poison had been introduced among the inmates. Without offering any opinion on the point at issue, I may remark that the history of the disease and of the circumstances connected with its appearance in this case suggests the many difficulties which beset such an investigation, and shows how essential it is that all the facts should be most carefully and thoroughly sifted before any conclusions can be safely drawn from them.

Meean Meer escaped.

115. The details of the cholera as it appeared at Lahore have a special interest in connection with the large station of Meean Meer, which is situated about four miles from the city. In 1856 and again in 1861 and 1862, the troops at Meean Meer had suffered very severely, and in the anticipations which were made regarding the probable course of the disease, this cantonment was especially mentioned as a place which would probably be attacked, and for the safety of which timely preparations should be made. These anticipations happily proved fallacious. From its position Meean Meer was certainly in the vicinity of grave danger, but not a single case occurred among its garrison, or among the people in its bazaars. Latterly, canal water which had been introduced into the station was used for drinking, but I am not inclined to attribute much of the result to this

change. The water runs in an open cutting and is thus very liable to pollution. Between the 16th and 19th June, and again from the 21st August to the 21st September, a cordon was drawn around the station, and no egress or ingress was allowed without leave. But the number of passes required for grass-cutters and other camp followers was so large* that beyond inspiring confidence little good could have resulted from this attempt at isolation of the cantonment.

A few cases at Nowshera.

116. In H. M.'s 88th Regiment at Nowshera, including women and children, there were six cases and five deaths. The first occurred on the 16th September, the others all before the end of the month. No communication could be traced to account for the appearance of the disease. The station is close to the high road leading to Peshawur, but stands at a considerable distance from Native population. Measures were adopted to prevent travellers entering from Peshawur where cholera was very prevalent.

The epidemic in the Peshawur valley. General population.

117. The city of Peshawur suffered from cholera even more severely than Umritsur, but it was not till the month of September that it was attacked with any violence. The disease was so prevalent and fatal in the cantonment that it will be well to sketch its course among the people generally before considering how it affected the troops. The first case in the district occurred on the 14th August in a village called Newdeh close to cantonments. Another followed there on the 20th. On that same day a case appeared in a village called Landee which is close to Newdeh. On the 1st September cholera broke out in the city, and from there it appeared to spread through the country. By the 13th it had a good hold upon all the irrigated portions of the district. But it was in the city itself that its greatest ravages were committed. Its progress there was most rapid. By the 7th September, the termination of the first week from the date of its appearance, 70 deaths from it had been registered. In the week ending the 14th there were 364. In the week ending the 21st there were 467. In the week ending the 28th, 232. The disease then declined as rapidly as it had increased, and in the week closing with the 2nd November only 19 deaths had been reported.

Its great severity in the city.

118. Great as had been the sufferings of the people from cholera in 1867, the epidemic of 1869 fell on them with much greater severity. In one day as many as 90 deaths occurred from cholera. In the nine weeks during which it lasted, out of a population of about 58,000, 1,480 died of it. A terrible dejection came over the people. "Days for public prayer," writes Captain Waterfield, the Deputy Commissioner, "were appointed at the Eedgah outside the city, and crowds assembled to pray for the removal of the pestilence; and in the silence of the night the cry of the city might be clearly heard from the cantonment as a deputation from each Mohulla assembled, and following their Imam wandered through the streets, and at given signals and stated intervals gave forth aloud the "Yaseen" from the Koran and the "Azan."

The disease in the villages.

119. Nor did the villages escape. The deaths from cholera in them were estimated as nearly 1,200. In some of them its advent was most severe. In Tungee, on the 2nd October, it suddenly attacked the student of a mosque who had not left the village for years, and that night there were 45 cases out of a population of 1,200. The details of the appearance and progress of cholera in the Peshawur valley have recently been enquired into by Dr. Ince, who was specially deputed by the Punjab Government to investigate the subject.

No evidence of importation.

120. Although very careful enquiries were made at the time, all attempts to trace the disease in the Peshawur valley to importation failed. Dr. Poole, who was officiating as Civil Surgeon, states:—"I can trace no sources of importation," and the Sub-Assistant Surgeon, Cheytun Shah, gives similar testimony: "No direct connection," he says, "has been traced to exist between the first seizures at Pesh-

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1,094 passes were granted in August and September.

awur and travellers from the affected districts of Umritsur and Lahore, who left while cholera was prevalent there, although some such travellers have entered Peshawur immediately before the appearance of the epidemic." Dr. DeRenzy, the Sanitary Commissioner of the Punjab, has fully reported on the many defects under which the city labors, and especially on the great impurity of the water-supply which reaches it in an open cutting from the Bara river, and is subject to all manner of contamination on its way.

In the Jail 31 prisoners attacked.

121. The strength of the jail at Peshawur averaged 411, and among the prisoners the disease was severe. The first case occurred on the 14th September, and three others followed within a few hours. No direct communication could be traced, but the disease by that time was raging both in the city and bazaars, and as there was no separate lock-up for persons under trial, there was every facility for the introduction of any contagion. A water-course which first traverses the cantonments and then enters the jail had been one source from which the supply for the prisoners had been drawn, and there is no question that the conditions to which this stream was subject before arriving at the jail would admit of almost any degree of contamination. As soon as the disease broke out this water-course was cut off apparently with good effect, and cholera appeared again to break out when the stream was again allowed to run through. Nearly 200 prisoners were removed into camp with decided benefit. Of 31 cases which occurred 13 proved fatal.

The Native population of cantonments suffered much.

122. In the bazaars belonging to the cantonments the disease was also very prevalent. On the 4th September the first case was reported in the Sudder. From that day to the 10th 20 deaths from cholera had been registered. It then rapidly increased, and between the 11th and 20th September 330 deaths had been recorded. The daily maximum was reached on the 20th, when the number was 42. From the 30th September the epidemic declined, and the last death from the disease was registered as having occurred on the 21st October. Cantonment registration is still most imperfect and unreliable, but the facts here stated are of interest and cannot be far from the truth. The day on which the heaviest mortality took place corresponds with the height of the outbreak among the European troops.

General results among the troops.

123. When cholera appeared at Peshawur, the European Garrison consisted of two Regiments of Infantry and four Batteries of Artillery; of Natives there were two Regiments of Cavalry, three of Infantry, and two Companies of Sappers and Miners. Before entering into the detailed history of the disease in these different bodies of men, it will be well to state generally how many cases of cholera and how many deaths occurred in each during the epidemic :—

		Admissions.	Deaths.
European Troops.	B—A R. H. A.	11	8
	E—A "	12	8
	B—19 R. A.	22	16
	4—22 "	11	8
	36th Regiment	202	117
	104th "	119	77
	Total of European Garrison ...	377	234
Native Troops.	18th Bengal Cavalry	31	18
	19th "	22	9
	3rd Regiment Native Infantry	36	20
	19th Punjab "	43	27
	25th " "	24	22
	28th " "	20	11
	Sappers and Miners (two Companies) ...	8	5
	Total ...	184	112

Native Troops, 18th Bengal Cavalry—31 cases and 18 deaths.

124. As the epidemic among the Native soldiers was much less severe, and as the facts regarding it are more simple, it will be convenient to dispose of them before attempting to state clearly what occurred among the European portion of the garrison. In the 18th Bengal Cavalry the first case occurred on the 8th September. Their lines were close to the Sudder Bazaar, where the disease had already established itself. The sowar attacked had been in the city within a day or two of being seized, but no other communication is traceable. The drainage of the lines was bad, they were much overcrowded, and as each man was allowed a private latrine close by his hut, their sanitary condition was very far from satisfactory. The water was drawn from a tank in the centre of the lines, and this supplied by the cantonment stream, which is most impure. The Regiment was moved under canvas, and the medical officer, Dr. Poole, is of opinion that the movement had a decided effect in checking the disease; the last case occurred on the 2nd October. The total admissions were 31 and the deaths 18.

19th Bengal Cavalry—22 cases and 9 deaths.

125. The 19th Bengal Cavalry lines were on the extreme left of the cantonment. A case occurred among the men as early as the 13th August; the second was on the 6th September, two days after the disease had first appeared in the cantonment. No communication could be traced. The lines were very defective, the drainage indifferent, the huts ill ventilated, and in some cases the floors were below the level of the surrounding ground. The men drank water from a covered tank, which is supplied by the cutting from the Bara river. As it passes through villages before reaching cantonments, it is very liable to contain impurities, and the mixture of choleraic discharges with it was not impossible. The Natives, however, generally prefer it to well water. On the 21st September the Regiment moved into camp and remained there until the epidemic had entirely ceased. In so far as this movement took the men from their close, ill ventilated huts, Dr. Watson believes that it was beneficial; 22 men were attacked and 9 died.

3rd Regiment Native Infantry—36 cases and 20 deaths.

126. In the 3rd Regiment Native Infantry a camp-follower was seized on the 16th September. This was the first case in the Regiment; two others followed on the same day. In none of them could communication with any previous case be traced. The lines of this Regiment were crowded and ill ventilated. The drinking water flows down the centre of them in an open channel or drain. A latrine, for the use of the troops, occupies a place within a few yards of this water-course, and as it is without a roof the sewage may easily be washed out by rain. At another part of its course in these lines this stream of water used for drinking runs within six feet of a private privy which is open, and from which sewage must escape. This water is doubtless subject to every form of contamination. The Regiment moved into camp on the parade ground, but no particulars are given and no opinion expressed on the results. Altogether 36 sepoys were attacked in this corps and 20 died.

19th Punjab Native Infantry—43 cases and 27 deaths.

127. In the 19th Punjab Native Infantry the first case occurred on the 11th September; no communication was traceable. The sepoys' huts are close, confined, and ill ventilated, and being sunk rather than raised, they must be damp. The water-supply is drawn from a similar source to that just described and is liable to like dangers. On the 25th September, after 31 cases had occurred, the lines were vacated, but as the epidemic was then on the decline, it is difficult to say how far this move affected the results. This Regiment suffered more severely than any of the other Native Infantry Corps. Of 43 cases 27 proved fatal.

25th Punjab Native Infantry—24 cases and 22 deaths.

128. In the 25th Punjab Native Infantry the first case occurred on the 19th September. No explanation could be given of it. The water-supply is the same as that already described. The medical officer is of opinion that, bad as the supply undoubtedly is, there is no evidence to show that it was

the means for communicating or spreading the disease. The Regiment did not move into camp till the 2nd October. As regards any advantage that was derived from this move, it is to be observed that the epidemic ceased generally throughout the cantonments immediately afterwards, and that no opinion can therefore be formed of the results. In this Regiment 24 sepoys were attacked and 22 died of cholera. From the 28th Native Infantry no report has been received. There were 20 cases in it and 11 deaths.

Sappers and Miners were early moved to Cherat.

129. On the 18th September one of the camp-followers of the Sappers and Miners was attacked. The case could not be traced to contact, either direct or indirect, with any of the previous cases which had occurred in the cantonment. The lines are described as being in a defective sanitary condition, and the water is open to the same serious objections as have been already stated. About the end of August nearly the entire strength of both Companies was sent to the hill of Cherat to prepare camping grounds for the European troops. Some time after their arrival a corporal and three men went to Peshawur for supplies. The day after their return to Cherat one of them was seized with cholera and died, and three days after that another corporal who had not been away from Cherat was attacked and died.

In the Royal Artillery, out of 4 Batteries, there were 56 cases and 40 deaths.

130. The E. Battery A. Brigade R. H. A. and the B-19th R. A. were both attacked on the 12th September. In 4-22 there was a case on the day following, but none in the B-A R. H. A. till the 18th. In the case of none of the Batteries could the occurrence of the first case be traced to communication with any person suffering from the disease. The water-supply of the Artillery is drawn from Mackeson's well; its quality is reported to be excellent, and contamination by sewage of any description declared to be impossible. The E-A Battery R. H. A. marched to Buddee Bhair on the 13th September and remained in camp till the close of the epidemic. The move is reported to have had a decided influence in checking the disease. On the 21st the B-A Battery R. H. A. also marched to Buddee Bhair with good results. On the 14th September, B-19 and 4-22 marched to the Bahlozaie camping ground, 13 miles from the cantonment. In the opinion of the medical officer the move tended to check the disease. In connection with the epidemic in these two Batteries, it is worthy of note that no less than ten Natives belonging to the hospital establishment were attacked; eight of them were dhooley bearers who had been employed in rubbing the sick and two were sweepers. Out of the four Batteries, including men, women, and children, there were 56 cases and 40 deaths from cholera.

In the 36th Regiment—202 cases and 117 deaths.

131. In the 36th Regiment cholera first appeared on the 11th September. Enquiry failed to trace any connection with a previous case. The water drank by the Regiment was taken from the Bara cutting which runs through their lines. When the man was attacked on the 11th, the Company to which he belonged was immediately placed in tents in the barrack square. On the 13th a second case having occurred, the Company in which it appeared was also encamped there. On the 15th and 16th two cases occurred in hospital, and the buildings were at once vacated. On the 16th the whole Regiment encamped on the parade ground. On the 17th there was a fifth case. On the 18th the disease showed itself in great violence; there were 29 admissions on that day. In the afternoon of the 18th there was a storm with heavy rain. Next morning the Regiment, having procured the requisite carriage, which was obtained with much difficulty owing to the great sickness among the people in the valley, marched to Bara Fort, eight miles from cantonments. But before the march could be made many fresh cases had occurred. On that day altogether there were 32 admissions, of which six took place after reaching Bara. Cases continued numerous. On the 23rd September they moved to the south of the Bara river, about 1½ miles from the first encampment. The disease still continued to prevail. On the 26th they again changed ground about 1,000 yards up the stream, and here the epidemic

moderated. The cases were few; among them was Dr. Bell, the Surgeon of the Regiment. On the 3rd October they recrossed the Bara and encamped a little above the spot first selected, and there they remained till the 11th October without any fresh admissions. On the 13th, at Hurree-Sing-ka-Bourj, the disease reappeared, and the Regiment retraced its steps to the ground near the Bara which it had just left. The last case occurred on the 20th October. The Regiment did not return to cantonments, but marched to Rawul Pindee across country, avoiding the station and the main road. In this terrible outbreak 180 men were seized with cholera, and of these 106 died.

Women and children left behind in cantonments.

132. No carriage was available to remove the families, and they remained in the cantonments throughout. Out of 42 women, 9, and of 60 children, 10, were attacked. In the depôt in cantonments also 75 men remained behind, 12 of these being cases of cholera left in hospital when the Regiment marched. Six cases occurred in the depôt among the men. Including men, women, and children, the cases in this Regiment numbered 202 and the deaths 117. Dr. Summers, the Deputy Inspector General of Hospitals, in his report on the epidemic in the Peshawur valley, remarks:—"The seizures amongst the personal attendants were as follows: the Surgeon and one orderly amongst a total of 19 orderlies employed in the hospital. Of 99 Native servants belonging to the hospital, eight were seized and six died. In this Regiment it was especially observed that convalescents from fever, diarrhœa, and dysentery, and invalids and time-expired men, were principally attacked."

In the 104th Regiment—119 cases and 77 deaths.

133. On the 11th September, the same day on which the first case occurred in the 36th Regiment, three men were seized in the 104th, and on the day following two more were attacked. On the 13th, after five cases altogether had appeared in the Regiment, the left wing, consisting of 197 men with 9 officers, and arranged in such a way as to include the affected Companies, marched to Chumkunnie. On the 14th, to Oomar; on the 15th, to Julozaie, and here they halted till the 27th. A good deal of diarrhœa prevailed in the wing during this halt, and three cases of cholera occurred, of which two were fatal. With the exception of these three cases, the wing altogether escaped, and arrived on the 30th September at Cherat, a hill about 30 miles from Peshawur and 5,000 feet in height.

The Left Wing removed from the valley on the 13th had three cases.

The Right Wing, which left on the 17th, had 68 cases.

134. The right wing, numbering 278 men and 17 officers, unhappily was much less fortunate. On the 13th September, some hours after the left wing marched, one case occurred among them. On the 14th there was one, on the 15th two, on the 16th one. On the morning of the 17th they marched to Chumkunnie, and on that day after arrival in camp there were four cases of cholera. The men were late in reaching the ground, and so it was determined to halt for a day. On the 18th there were 15 admissions. On the afternoon of that day, about 5 o'clock, there was a storm of dust and rain; part of the same storm which was observed in the cantonment. Next morning they moved two miles off to some rising ground. Cases were coming in fast. This 19th was their worst day, 27 soldiers having been attacked on it. From this date the disease began to decline. The last case occurred on the 29th, and on the 7th October both wings of the Regiment were together at Cherat. When I saw them there on the 25th November, they were in excellent health and had only 13 sick.

Contrast between the two Wings as regards the number of cases of cholera.

135. The contrast between the experience of the two wings of this Regiment is most marked. In the left wing, which marched out on the 13th September, two days after the disease had attacked it, there were three cases of cholera and two deaths. In the right wing, which did not leave till the 17th, there were 68 cases and 42 deaths. The details of these are given in the annexed statement.

Statement showing the dates on which the cases and deaths from Cholera occurred in the Right Wing of the 104th Regiment while on their march.

Date.	Place.	Admitted.	Died.
17th Sept. ...	Chumkunnie	3	0
18th " ...	Ditto	15	6
19th " ...	2 miles from—	27	5
20th " ...	Ditto	7	9
21st " ...	Oomar	2	4
22nd " ...	Oomarpayan	2	3
23rd " ...	Ditto	3	3
24th " ...	Ditto	0	2
25th " ...	Julazaie	0	0
26th " ...	Ditto	5	2
27th " ...	Ditto	1	1
28th " ...	Ditto	1	2
29th " ...	Shahkote	2	1
30th " ...	Ditto	...	2
3rd Oct. ...	Ditto	...	1
5th " ...	Ditto	...	1
	TOTAL	68	42

The depôt left behind in cantonments had many cases.

136. After both wings of the Regiment had left Peshawur, there still remained 132 men, who were partly on duty in the fort and partly in hospital, and besides there were 43 women and 55 children, all of whom stayed behind in cantonments. Out of this small strength, 38 cases of cholera occurred in Peshawur after the two wings had marched. Of the men, 36 in a few days joined the head quarters in two parties of 18 each, but as two of them were attacked with cholera soon afterwards, it was considered more prudent to prevent any further parties from coming from cantonments. In considering the number of cases which occurred in the depôt in cantonments, the early removal of 36 of the men must be taken into account, as well as the fact that the fort, where a considerable number of them were on duty, almost entirely escaped.

Sanitary condition of Peshawur very unsatisfactory.

137. The sanitary condition of Peshawur has been very unsatisfactory. In addition to its unfavorable situation in a valley shut in on nearly all sides by hills, special circumstances have contributed to add to its defects. When the cantonment was originally occupied by us, and for years afterwards, the country was in a very unsettled state, and it was therefore essential to make the station as compact as possible. The lines are thus very close together, and much crowded in themselves. Even now it is not considered safe for any person to go any distance from them after dark, and to obviate this difficulty latrines have been provided for the Native soldiers close to their huts, and what is much worse, close to the stream, which supplies their drinking water. This stream is a small cutting fed by the Bara river which flows through the cantonment, and which has been frequently mentioned in connection with the many impurities to which it is subject. Its possible connection with the cholera will be referred to hereafter in discussing the facts which have been brought to notice in this epidemic.

Immunity of the Fort.

138. The small fort which is close to the city, and which is held by a garrison of 32 European and 75 Native soldiers, almost entirely escaped. Here quarantine was enforced, but it appears to be very doubtful how far the favorable results are justly ascribable to this precaution. All the Native inhabitants went outside every morning, they cooked outside, and all the water for the use of those within was brought from a well in an adjoining serai. The rations supplied to the Europeans and the supplies used by the Natives, must all have come from the

city or the bazaars. It has been stated that the fort entirely escaped the cholera, and this was frequently mentioned to me as a fact during my visit to Peshawur, but on more minute enquiry I found that one soldier of the 104th had been attacked, and on reference to the detailed account of the epidemic in that Regiment, I find that he was admitted from the fort with cholera on the 23rd October. This solitary case does not, however, contradict the statement that the garrison of the fort preserved a singular immunity from the disease.

In Kohat the Native troops forming the garrison were attacked with unusual violence.

139. In both the town and district of Kohat and especially in the former, cholera was very severe. Although almost entirely confined to the month of October, the numbers that fell victims to it during its short visit were very numerous. The first case known to have occurred throughout the district was seen on the 29th September in the jail which is situated within the town. As soon as it was known that cholera prevailed in Peshawur, quarantine was established, and the Civil Surgeon expresses his opinion that the disease was by these arrangements prevented from entering Kohat for a time. On the Native troops in the cantonment the chief violence of the epidemic fell.

General facts connected with the epidemic at Kohat.

140. At the time the cholera appeared, the garrison which was entirely composed of Native troops consisted of three Batteries of Artillery, one Regiment of Cavalry, and three of Infantry. From none of these have special reports been received in answer to the questions which were issued, and there are thus some points of importance on which no information is available. Dr. Kelly, who was in medical charge of the 1st Punjab Infantry at the time, has been good enough to furnish a general account of the epidemic, from which the following interesting particulars are extracted :—

"I am unable to state accurately when the first case of cholera occurred, or where it occurred. The following is a general sketch of the epidemic. During the month of September quotidian intermittent fever was very prevalent in Kohat. Diarrhœa in some instances accompanied the fever, but was not severe or obstinate; there were few admissions on account of diarrhœa and dysentery, as the following table will show :—

CORPS.	Admitted for Dysentery.	Admitted for Diarrhœa.
14th Punjab Cavalry	2	0
1st Punjab Infantry	4	6
2nd Punjab Infantry	6	11
4th Punjab Infantry	7	7

During October there were still fewer cases of diarrhœa or dysentery, but in September and October several cases of a peculiar form of disease occurred, the chief symptoms of which were thin watery stools, vomiting of a clear fluid, and some degree of collapse; these symptoms in most cases occurred in the subjects of fever, constituting the 'pernicious' fever of some writers; the symptoms closely resembled cholera, but they are distinct and different diseases.

"About the 10th September, a seven days' quarantine was established for all persons coming from Peshawur, but though it is stated that a few eluded the vigilance of the quarantine officials, it is certain that the number was very limited; the nearest and largest of the quarantine camps was about five miles distant from Kohat. The quarantine camps were not broken up till the middle of October, when the disease was raging at Kohat; no case of cholera occurred in any of the quarantine camps, nor did the Afredees, who live in the Kohat Pass and in the hills between Peshawur and Kohat, suffer from cholera.

"On the 29th September, Dr. Ross, the Civil Surgeon, saw the wife of a Native gentleman who lived in a village about 150 yards from the General Hospital, which is situated on the east of cantonments : from the history of the case and the symptoms present, he believes that she was suffering from cholera. She became ill on the 28th, and died on the 30th September. On the 30th September a true case of cholera occurred in this village. Now, it is stated that one of those who eluded the quarantine officials was received into this village and even into the house where the woman died, but whether this report is true or false, I have no means of ascertaining, though from the various phases the story assumed, I am inclined to think that the authors of it, feeling convinced that the outbreak must be due to contagion, were too ready to believe a statement which coincided with this theory.

"The first reliable case of cholera occurred on 29th September in the Kohat Jail; the prisoner was four months in jail; he was in no respect differently circumstanced from the other prisoners; he died on the 30th. The Jail Darogah died of cholera about the middle of October. It is right to state that the prisoner who died on the 30th September passed some pink-coloured stools, but the general character of his symptoms and discharges was that of true cholera. I did not see this case. Now, no explanation can be offered as to the origin of cholera within the Kohat Jail; its sanitary condition was excellent, the prisoners were remarkably healthy, and there can be no suspicion that any one connected with the jail had lately been in contact with cholera patients. The prisoner who died was attacked while at his work.

"On the evening of the 2nd October, a barber of the 4th Punjab Cavalry was attacked by cholera; he died during the night. From this date cases began to occur here and there in cantonments and in the neighbouring villages; but as no accurate records have or could be kept, it is impossible to trace the history of the outbreak in any particular Regiment or village.

"The 2nd Punjab Infantry contracted the disease while in camp; this Regiment suffered most.

"The 1st and 4th Punjab Infantry remained in cantonments and suffered comparatively little.

"The two Batteries of Artillery moved into camp as soon as the first case of cholera appeared among the camp-followers of one of them; this man was left behind. Both Batteries suffered considerably.

"The 4th Punjab Cavalry also moved into camp when the disease appeared and suffered severely.

"These are bare facts of which I do not pretend to offer any explanation. I cannot satisfy myself that there was anything in the meteorological phenomena that preceded or accompanied this outbreak which can be fairly proved even to predispose to cholera. The drinking water of Kohat is impure; the chief impurity is organic matter, or the products of decomposing organic matter: malarial fevers, dysentery, diarrhœa, and pneumonia, and cholera, when it occurs, are severe, and this severity is said to be mainly due to the impurity of the drinking water, but the arguments in support of this theory are not conclusive. The bad effects of impure drinking water are not denied, but facts do not support the exaggerated views which some entertain on this subject.

"Diseases which are said to be due to impure drinking water, and those which have not this origin, are alike severe at Kohat, but the cause of this severity is unknown, though impure drinking water is one of the factors.

"The following table shows the admissions and deaths from cholera:—

CORPS.	Admitted.	Died.
4th P. Cavalry	71	64
1st P. L. F. Battery	38	21
P. M. Battery	23	17
1st P. Infantry	40	29
2nd P. Infantry	114	88
4th P. Infantry	46	31
TOTAL ...	332	250

"This return includes the camp-followers; most of this class who were attacked died."

The water-supply at Kohat is very impure.

141. The water-supply of Kohat very much resembles that of Peshawur. It is chiefly derived from open cuttings, which are liable to every form of pollution. From one of these a large tank is supplied; but "before reaching this tank," observes Dr. DeRenzy in his account of the town and station of Kohat, which is appended to his annual sanitary report of the Punjab for 1868, "it receives the overflow from the station plunge-bath, and continuing its course in an open masonry drain, it forms a lounge for dogs in the hot weather, and receives the drainage of the adjacent surface which is the urinal of the garrison."

In Bunnoo the epidemic was much less severe.

142. In the hope of preventing the entrance of the disease into Bunnoo, a very strict quarantine was kept up, but on the 3rd November it appeared among the people. On the 7th it showed itself in the city; on the 8th it attacked the cantonment. A sowar belonging to the 1st Punjab Cavalry had spent the evening of the 7th in the city with a prostitute. Next night the woman was attacked and died, and the following day the man himself was seized. On the 10th a second case occurred, and the Regiment moved into

camp. Three others followed on the 24th, and then the disease ceased. The other troops at this station suffered even less than the Cavalry. With the exception of Bunnoo and Kohat, and also of Murdan, where three soldiers were attacked, the stations occupied by the Punjab Frontier Force altogether escaped.

Statement showing the comparative prevalence of cholera in the districts and stations of the Punjab during 1869.

143. The general results of the epidemic as it affected the Punjab, the fifth group of stations, which has just been considered in detail, will appear from the following table:—

Statement showing the comparative prevalence of Cholera in the Districts and Stations of the Punjab during 1869

STATIONS.	EUROPEAN TROOPS, MEN, WOMEN, AND CHILDREN.			NATIVE TROOPS.			PRISONERS.			GENERAL POPULATION.		
	Average Strength.	No. of cases.	No. of deaths.	Average Strength.	No. of cases.	No. of deaths.	Average Strength.	No. of cases.	No. of deaths.	Population.	No. of deaths.	Ratio of deaths per 1,000.
Rohtuck ...	...	...	...	...	...	...	214	...	...	536,995	46	0·08
Hissar ...	...	...	...	...	...	...	260	...	...	484,681	301	0·62
Sirsa ...	...	...	..	...	...	...	315	1	...	210,795	72	0·34
Kurnal ...	...	...	..	...	...	...	145	...	...	610,927	39	0·06
Umballa .	1,676	...	...	913	1	...	669	...	...	1,008,952	48	0·05
„ Gang at Jhugger	...	...	...	...	...	...	312	...	..	......	...	...
Loodiana ..	...	...	...	87	...	...	225	...	...	583,445	19	0·03
Phillour ..	.	...	...	83	1	...	.	...	...	......	...	..
Jullundur ...	1,022	2	2	476	1	...	397	...	...	783,020	9	0·01
Ferozepore ...	1,145	1	1	594	1	...	428	...	...	533,416	20	0·04
Umritsur ...	125	9	7	149	...	...	583	7	6	832,750	3608	4·33
Meean Meer ...	1,268	...	...	1,269	...	...	...	...	...	......	...	...
Lahore ...	.	...	...	...	...	...	2,089	...	...	775,551	297	0·38
„ Female Jail ...	...	...	...	...	...	..	145	2	2	......	...	...
„ Fort ...	84	...	...	...	...	..	...	...	...	......	...	..
Sealkote ...	1,410	..	...	1,002	...	...	374	...	...	994,458	31	0·03
Goordaspore ...	...	.	...	..	...	...	321	...	...	906,126	155	0·17
Goojranwallah ..	...	..	...	...	...	...	496	...	...	550,576	89	0·16
Goojrat	..	...	...	...	..	...	314	...	...	616,347	61	0 10
Shahpoor ...	...	..	..	...	...	...	367	...	...	368,796	1	...
Jhelum ..	..	..	...	1,599	...	...	358	...	...	500,988	7	0·01
Montgomery ...	...	...	...	...	...	...	527	...	...	359,437	16	0·04
Mooltan ...	1,123	1	...	946	...	...	751	...	...	459,780	2	...
Jhung ...	..	...	...	...	..	...	344	...	...	348,027	1	...
Dera Gazee Khan ...	...	...	...	1,591	...	...	368	...	...	305,903	2	0·01
Dera Ismail Khan ...	99	1	1	1,657	...	...	327	...	...	389,533	2	0·01
Attock ...	179	...	...	171	...	...	...	...	...	......	...	...
Kohat ...	...	...	...	2,395	190	136	144	2	1	140,209	508	3·62
Bunnoo ...	...	...	...	1,688	6	5	83	...	...	287,547	124	0·43
Rawul Pindee ...	1,955	..	...	1,138	...	...	943	...	...	699,647	13	0·02
Campbellpore ...	485	...	...	...	...	...	..	...	...	......	...	...
Tullagunge ...		...	...	622	...	...	...	...	...	......	...	...
Nowshera ...	669	6	5	1,042	...	...	...	...	...	......	...	...
Peshawur ...	2,050	377	241	3,380	179	111	411	31	13	408,479	2,985	5·99
Outposts of Peshawur	...	..	..	...	2	1	...	...	...	......	...	...
Troops on march, Punjab ...	...	...	...	...	1	1	...	...	...	......	...	...
Murdan ...	...	...	...	867	3	1	...	...	...	......	...	...
Abbottabad ...	...	...	...	1,421	...	...	...	...	...	......	...	...
Rajanpore	...	...	...	405	...	...	...	...	...	......	...	...
Bhawulpore ...	...	...	...	193	...	...	...	...	...	......	...	...

Very little is known of the cholera in Caubul.

144. Regarding cholera in the Caubul country very little is known. On the 11th November 1869 it was reported that "cholera and fever had largely spread in Jellalabad and the neighbouring villages. A dâk runner, who brought the dâk of the 21st October last from Peshawur, died at Futtehabad; his bag was brought to Caubul with the dâk of the 24th idem by other runners." On the 15th November it is stated that "cholera is slightly decreasing in Jellalabad." In a subsequent report, dated the 23rd November, it is mentioned that "cholera appeared at Jellalabad and spread to the surrounding country as far as Futtehabad, Balabagh, Numlah, and Gundamuk, and after lasting for about a month and a half has entirely disappeared, except in Koonur, where cases occasionally occur." Beyond these incidental notices, which have been collected from the records of the Foreign Office, nothing is known regarding the appearance of the disease in Caubul.

Remarkable immunity of the hill stations generally.

145. The immunity from cholera, which the hill stations generally enjoyed, is very remarkable. Including those where Native soldiers are located, there were 18 different places on the hills where troops were stationed during the time the disease prevailed in the plains, and in only two of these did any case occur. The two exceptions were Shillong, where sepoys and prisoners both were attacked, and Subathoo, where the 41st Regiment suffered more severely. No particulars have been received regarding the few cases at Shillong. The outbreak at Subathoo requires notice.

Outbreak at Subathoo.

146. The first case among the soldiers there was reported on the 5th August. A native servant in the employment of a resident in cantonments had died of the disease the day previous, and it is worthy of notice that one of the children, of whom this servant had charge, was afterwards attacked and died on the 12th August. Excepting these two cases, the non-military population of the cantonment and of the bazaars, both European and Native, entirely escaped. It was rumoured that the disease had been introduced into the station by the native servant of an Officer on his way to Simla, who was attacked at Subathoo *en route*, and afterwards died at Simla. But although the fact of this servant's death at Simla is beyond doubt, and although it is also clearly established that he died of cholera, and moreover although there is ground to believe that on the night of his stay in the Subathoo bazaar he was suffering from choleraic purging, there is no evidence that the cases which afterwards occurred had any connection with this man's illness. The sanitary condition of the station was reported to be good, the water wholesome, and not liable to contamination. After 17 cases had occurred, the regiment was moved on the 1st and 3rd September into camp in two detachments, one occupying ground on the Banaloghi ridge opposite to Subathoo, and the other at Solon. Among the first of these, three cases occurred after leaving cantonments; they then moved to a higher part of the ridge, and the disease ceased. The other party had one case and only one in camp. The medical officer is doubtful how far the checking of the epidemic was due to these movements. Altogether there were 28 cases and 19 deaths; out of these 6 were attacked in the cantonment hospital.

Statement showing the remarkable immunity of the hill stations.

147. The remarkable immunity from cholera, which the hill stations enjoyed, is strikingly shown in the annexed statement. It is to be observed that Subathoo, the only one in which the European soldiers were attacked, is of lower elevation than any of the others.

Statement showing the remarkable immunity from Cholera of the Hill Stations in the Bengal Presidency during 1869.

STATIONS.	Height above the level of the sea.	EUROPEAN TROOPS—MEN, WOMEN, AND CHILDREN.			NATIVE TROOPS.			PRISONERS.		
		Average strength.	No. of Cases.	No. of Deaths.	Average strength.	No. of Cases.	No. of Deaths.	Average strength.	No. of Cases.	No. of Deaths.
	Feet.									
Shillong	5,000	...	...	...	818	10	3	58	12	11
Darjeeling Depôt	7,167	105	...	...	...	...	...	...	...	..
Darjeeling		127	...	..	...	...	...	52	.	...
Almorah	5,350	...	...	...	665	...	...	132	...	...
Raneekhet Road	6,377	198	...	...	..	...	...	...	...	...
Nynee Tal	6,400	524	...	...	...	...	...	...	...	...
Landour	7,288	283	...	...	...	...	...	...	...	...
Chuckrata Road	6,060	930	...	...	408	...	...	...	...	...
Subathoo	4,253	1,010	28	19	...	...	...	...	...	...
Dugshai	6,100	1,073	..	...	...	...	...	...	...	...
Kussowlie	6,335	491	...	...	...	...	...	...	...	...
Simla	7,100	100	...	...	142	...	...	...	...	...
Jutogh										
Kangra	2,424	81	...	...	...	...	...	...	...	...
Dhurmsala	6,116	108	...	...	582	...	...	123	..	...
Road-making Detachment, Dalhousie Hills	8,000	516	...	...	...	...	...	...	...	...
Murree Depôt	7,800	672	...	...	...	...	...	...	...	...
Road-making Detachment, Murree Hills	...	609	...	...	102	...	...	...	...	...
Bukloh	...	...	...	...	670	...	...	...	...	...

General statistics of cholera among European men, women and children, and among the general population according to Provinces.

148. In concluding this portion of the report, it will be advisable to append a general statement showing the admissions and deaths from cholera among British soldiers throughout the Bengal Presidency, distinguishing the cases among men, women and children, and at the same time to give the number of deaths from cholera registered among the general population, the districts being arranged not according to the distribution of the disease, but according to the local Government or Administration to which they belong.

Statement showing the total admissions and deaths from cholera among European troops, men, women, and children, at each station of the Bengal Presidency during the year 1869.

Groups.	Stations	Average Strength for the 12 months.				Admissions and Deaths.								Ratio per 1,000 of Strength.	
						Men.		Women.		Children.		Total.			
		Men.	Women.	Children.	Total.	A.	D.	A.	D.	A.	D.	A.	D.	Admissions.	Deaths.
	Chinsurah Depôt	123	19	30	172	4	4	......	......	......	......	4	4		
	Invalids & Volunteers on the march	81	......	......	81	......	......	......	......	......	......	......	......		
		204	19	30	253	4	4	......	......	......	......	4	4	15·81	15·81
1st Group.	Fort William	904	89	117	1,110	......	......	......	......	......	......	......	......		
	Dum-Dum	500	53	82	635	2	......	......	......	......	......	2	......		
	Barrackpore	395	40	91	535	......	......	1	1	......	......	1	1		
	Berhampore (8 months) ..	103	9	20	132	1	1	......	......	......	......	1	1		
		1,902	200	310	2,412	3	1	1	1	......	......	4	2	1·65	·82
2nd Group.	Hazareebaugh	725	73	115	913	......	......	......	......	1	1	1	1		
	Dinapore	867	72	126	1,065	4	1	......	......	......	......	4	1		
	Benares	732	77	97	906	3	2	......	......	......	......	3	2		
	Chunar	56	1	3	60	1	......	......	......	......	......	1	......		
	Fyzabad (10 months)	786	104	182	1,072	24	17	3	2	1	1	28	20		
	Roy Bareilly (10 months) ...	64	55	118	237	......	......	......	......	......	......	......	......		
	Lucknow	2,279	313	515	3,107	78	62	8	4	36	31	122	97		
	Seetapore	532	73	98	703	8	5	1	1	1	1	10	7		
	Futtehgurh	192	21	51	264	......	......	......	......	......	......	......	......		
	Cawnpore	1,040	122	148	1,310	20	12	4	3	3	2	27	17		
	Allahabad	879	90	172	1,141	117	87	10	5	21	14	148	106		
		8,152	1,001	1,625	10,778	255	186	26	15	63	50	344	251	31·91	23·28
3rd Group.	Shahjehanpore	455	52	77	584	2	......	......	......	......	......	2	......		
	Bareilly	783	78	144	1,005	......	......	......	......	1	1	1	1		
	Moradabad	312	35	47	394	......	......	......	......	......	......	......	......		
	Roorkee	372	35	48	455	......	......	......	......	......	......	......	......		
	Meerut	1,421	191	304	1,916	15	10	5	4	3	2	23	16		
	Delhi	362	85	60	447	......	......	......	......	......	......	......	......		
	Muttra	420	56	84	560	......	......	......	......	......	......	......	......		
		4,125	482	754	5,361	17	10	5	4	4	3	26	17	4·84	3·17
4th Group.	Agra	895	66	97	1,058	......	......	1	1	......	......	1	1		
	Morar	760	118	203	1,081	105	63	18	12	20	15	143	90		
	Gwalior Citadel	268			268	11	7	1	1	1	1	13	9		
	Seepree	132	10	14	156	3	3	......	......	2	2	5	5		
	Jhansie	611	59	100	770	54	6	1	1	2	2	57	9		
	Nowgong	170	19	32	221	7	4	2	2	......	......	9	6		
	Saugor	892	70	110	1,072	52	38	13	7	12	8	77	53		
	Jubbulpore	646	62	101	809	13	11	1	......	1	1	15	12		
		4,374	404	657	5,435	245	132	37	24	38	29	320	185	58·87	34·02
5th Group.	Umballa	1,332	127	217	1,676	......	......	......	......	......	......	......	......		
	Jullunder	778	101	143	1,022	2	2	......	......	......	......	2	2		
	Ferozepore	893	94	158	1,145	1	1	......	......	......	......	1	1		
	Mooltan	863	104	156	1,123	1	......	......	......	......	......	1	......		
	Dera Ismail Khan	99	......	......	99	1	1	......	......	......	......	1	1		
	Sealkote (10 months)	1,106	94	173	1,373	......	......	......	......	......	......	......	......		
	Govindgurh...	117	4	4	125	8	6	1	1	......	......	9	7		
	Fort Lahore...	81	1	2	84	......	......	......	......	......	......	......	......		
	Meean Meer...	974	127	167	1,268	......	......	......	......	......	......	......	......		
	Rawul Pindee	1,567	172	216	1,955	......	......	......	......	......	......	......	......		
	Campbellpore	409	33	43	485	......	......	......	......	......	......	......	......		
	Attock	166	5	8	179	......	......	......	......	......	......	......	......		
	Nowshera	531	54	84	669	3	2	1	1	2	2	6	5		
	Peshawur	1,723	134	193	2,050	323	207	21	12	33	22	377	241		
		10,639	1,050	1,564	13,253	339	219	23	14	35	24	397	257	29·95	19·39
6th Group.	Darjeeling Depôt (9 months) ...	88	......	......	88	......	......	......	......	......	......	......	......		
	Darjeeling	68	18	41	127	......	......	......	......	......	......	......	......		
	Raneekhet Road (7 months) ...	122	......	......	122	......	......	......	......	......	......	......	......		
	Nynee Tal (8 months)	301	27	50	378	......	......	......	......	......	......	......	......		
	Landour (7 months)	134	14	32	180	......	......	......	......	......	......	......	......		
	Chuckrata (8 months)	567	25	37	629	......	......	......	......	......	......	......	......		
	Jutogh (7 months)	47	3	8	58	......	......	......	......	......	......	......	......		
	Subathoo (10 months)	667	71	104	842	24	16	2	1	2	2	28	19		
	Dugshaie (10 months)	675	82	113	870	......	......	......	......	......	......	......	......		
	Kussowlie (8 months)	250	24	42	316	......	......	......	......	......	......	......	......		
	Kangra	66	5	10	81	......	......	......	......	......	......	......	......		
	Dhurmsalla (7 months) ...	62	1	......	63	......	......	......	......	......	......	......	......		
	Road-making Detachment, Dalhousie Hills (5 months) ...	267	......	......	267	......	......	......	......	......	......	......	......		
	Murree Depôt and family camp (6 months)	193	65	123	381	......	......	......	......	......	......	......	......		
	Road-making Detachment, Murree Hills (7 months)	356	2	3	361	......	......	......	......	......	......	......	......		
	Hazara Hills	......	1	1	2	......	......	......	......	......	......	......	......		
		3,863	338	564	4,765	24	16	2	1	2	2	28	19	5·87	3·98
	Troops marching Punjab ...	619	109	184	912	......	......	......	......	......	......	......	......		
	Recruits, &c., marching Punjab ...	157	......	......	157	1	1	......	......	......	......	1	1		
	Troops on the march in Bengal and N. W. P.	588	......	......	588	1	1	......	......	......	......	1	1		
		1,364	109	184	1,657	2	2	......	......	......	......	2	2	1·20	1·20
	Grand Total ...	34,623	3,603	5,688	43,914	889	570	94	59	142	108	1,125	737	25·61	16·78

Statement showing the number of deaths from cholera in the Province of Oudh from January to December 1869.

DISTRICT.		POPULATION.	NUMBER OF DEATHS IN EACH MONTH.												TOTAL.	Ratio of deaths from cholera per 1,000 per annum in each district.
			January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
Lucknow	...	6,97,499	2	...	3	36	115	115	40	194	106	33	11	3	658	0·94
Ditto (City)	...	2,73,126	1	...	2	1	10	18	5	123	13	...	...	...	173	0·63
Fyzabad	...	14,37,009	89	14	89	485	453	528	196	205	143	119	31	24	2,376	1·65
Seetapore	...	9,30,224	21	67	336	825	392	144	66	23	10	78	44	12	2,018	2·17
Sultanpore	...	9,30,023	142	52	43	17	49	339	326	656	217	237	118	59	2,255	2·42
Gondah	...	11,67,816	2	5	5	225	763	1,015	707	392	335	95	10	...	3,554	3·04
Roy Bareilly	...	7,82,874	4	1	4	213	468	1,018	1,259	997	288	274	165	88	4,779	6·10
Pertabgurh	...	9,36,053	25	27	192	472	315	156	58	224	81	132	63	17	1,762	1·88
Baraich	...	7,74,437	...	...	4	247	635	232	30	66	58	2	...	...	1,274	1·65
Hurdui	...	9,30,977	...	4	1	32	8	64	52	30	24	113	10	1	339	0·36
Kheree	...	7,37,732	...	4	...	17	5	38	7	...	...	...	...	...	71	0·10
Oonao	...	7,24,949	...	3	10	13	63	340	523	1,119	341	119	25	47	2,603	3·59
Barabunkee	...	8,75,376	41	...	...	31	118	142	279	210	109	319	14	9	1,272	1·45
TOTAL	...	1,11,98,095	327	177	689	2,614	3,394	4,149	3,548	4,239	1,725	1,521	491	260	23,134	2·06

Deaths from cholera in each District of the North-Western Provinces during each month of 1869.

DISTRICT.	POPULATION.	NUMBER OF DEATHS IN EACH MONTH.												TOTAL.	Ratio of death per 1,000
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
Dehra Doon ...	1,02,631	...	...	...	...	...	...	...	1	...	...	...	...	1	...
Seharunpore ...	8,66,483	6	5	83	14	9	18	13	6	1	12	5	10	182	0·2
Mozuffernuggur ...	6,82,189	10	14	10	18	10	32	7	15	13	13	8	16	166	0·2
Meerut ...	11,99,593	7	7	5	17	9	21	12	45	152	240	34	16	565	0·4
Boolundshuhur ...	8,00,481	3	7	4	12	12	14	6	16	50	22	7	2	155	0·2
Allygurh ...	9,25,538	10	5	2	12	12	53	41	185	76	14	12	7	429	0·4
Kumaon ...	3,85,790	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gurhwal ...	2,48,742	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bijnour ...	6,90,975	1	3	2	9	9	7	6	8	4	9	5	5	68	0·1
Moradabad ...	10,95,306	12	9	17	15	19	21	23	13	20	17	19	10	195	0·2
Budaon ...	8,89,810	3	2	7	15	11	9	10	92	350	562	72	8	1,141	1·3
Bareilly ...	14,64,199	20	14	22	32	19	19	14	204	188	275	123	5	935	0·6
Shahjehanpore ...	9,18,850	...	...	...	24	13	2	2	2	4	174	35	1	257	0·3
Turrai ...	91,802	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Muttra ...	8,00,321	3	2	7	8	13	122	284	337	144	110	23	7	1,060	1·3
Agra ...	10,28,544	3	5	3	11	39	336	797	568	104	26	7	14	1,913	1·9
Furruckabad ..	9,15,943	3	...	10	8	6	25	37	121	42	63	10	...	325	0·3
Mynpooree ...	7,00,220	2	4	5	9	9	7	28	51	87	136	9	2	349	0·5
Etawah ...	6,26,444	1	...	2	6	6	3	14	30	60	252	67	8	449	0·7
Etah ...	6,14,351	8	1	6	9	8	30	37	36	22	64	20	1	242	0·4
Jaloun ...	4,05,272	...	...	2	3	36	571	319	1,250	322	75	...	...	2,578	6·4
Jhausie ...	3,57,774	...	...	...	1	...	35	163	1,438	152	5	...	...	1,794	5·0
Lullutpore ...	2,48,146	...	...	...	...	20	1,186	779	479	219	13	6	...	2,702	10·9
Cawnpore ...	11,88,862	2	3	5	21	72	183	175	1,281	548	452	56	...	2,798	2·4
Futtehpore ...	6,80,786	...	1	281	8	25	474	163	136	122	66	24	...	1,300	1·4
Banda ...	7,24,372	...	...	...	221	123	410	197	321	36	85	...	...	1,393	1·9
Allahabad ...	13,93,183	16	52	179	283	642	280	260	1,089	47	10	6	...	2,864	2·1
Humeerpore ...	5,20,941	...	...	1	...	32	55	759	957	212	39	4	...	2,059	3·9
Jounpore ...	10,15,427	9	7	79	381	509	606	491	597	104	62	7	11	2,863	2·8
Goruckpore ...	19,83,816	1	2	39	468	673	1,496	2,451	2,128	947	350	36	2	8,593	4·3
Bustee ...	14,55,697	7	2	141	786	688	1,339	1,004	223	105	54	...	...	4,349	3·0
Azimgurh ...	13,85,872	6	12	10	52	260	1,018	2,204	3,196	1,155	691	203	9	8,816	6·3
Mirzapore ...	10,54,413	...	30	253	296	607	977	901	883	543	327	12	26	4,855	4·5
Benares ...	7,93,277	8	24	98	233	352	702	720	1,090	262	25	7	6	3,527	4·4
Ghazeepore ...	13,32,403	10	5	11	176	694	1,343	2,422	4,194	818	75	6	14	9,768	8·1
TOTAL ...	2,95,88,653	151	216	1,284	3,148	4,937	11,394	14,339	21,092	6,909	4,318	823	180	68,691	2·32

Deaths registered from cholera in the Districts of the Central Provinces during each month of the year 1869.

No.	District.	Population under Registration.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Ratio of deaths from cholera per 1,000 per annum in each district.
			Number of Deaths in each Month.													
1	Saugor ...	4,90,636	12	2	...	62	1,041	4,366	2,852	929	112	...	...	...	9,376	19·1
2	Dumoh ...	2,80,554	...	...	...	159	968	1,354	242	399	74	...	...	...	3,196	11·0
3	Jubbulpore ...	5,39,106	1	4	...	487	1,590	2,034	410	135	23	...	..	...	4,684	8·6
4	Nursingpore ...	3,40,356	...	...	...	395	1,530	2,074	321	5	...	...	...	...	4,325	12·5
5	Hoshungabad ...	4,27,056	37	10	12	72	666	1,181	328	67	6	...	...	...	2,379	5·5
6	Nimar ...	1,66,882	17	80	211	117	12	29	42	59	50	...	...	...	617	3·6
7	Baitool ...	2,54,915	...	11	42	4	61	111	78	51	43	4	3	3	411	1·6
8	Chindwarrah ...	2,60,913	...	...	...	52	14	26	6	...	5	...	...	...	103	0·3
9	Seonee ...	4,21,650	...	...	151	176	358	1,040	265	58	11	...	...	...	2,059	4·8
10	Mundla ...	2,17,264	1	...	29	30	708	2,089	621	467	173	211	11	3	4,343	19·9
11	Balaghat ...	1,73,121	...	...	...	...	25	303	70	40	6	...	...	...	444	2·5
12	Bhundarah ...	6,08,480	...	...	...	...	...	121	141	521	171	...	...	...	954	1·5
13	Nagpore ...	5,58,119	...	...	16	102	67	134	64	610	235	64	...	...	1,292	2·3
14	Wurdah ...	1,76,228	...	...	...	103	254	223	437	613	105	22	2	...	1,759	9·9
15	Chanda ...	4,14,869	...	...	...	...	...	1	82	485	153	...	...	...	721	1·7
16	Sironcha ...	54,680	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	Raipore ...	5,86,118	...	...	...	...	1,037	4,471	2,202	1,081	558	...	...	...	9,349	15·9
18	Belaspore ...	5,30,541	...	...	62	199	1,029	2,938	3,586	1,154	224	28	...	...	9,220	17·3
19	Sumbulpore ...	2,68,295	...	...	...	...	...	6	87	277	278	62	...	...	710	2·6
	Total ...	70,18,078	70	103	523	1,954	9,319	22,502	11,836	6,950	2,227	391	16	6	55,897	7·9

Statement shewing the monthly deaths from cholera in each district of the Berars during 1869.

No.	District.	Population.	Number of deaths from cholera in each month.												Total.	Ratio of deaths from cholera per 1,000 per annum in each district.
			January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
1	Oomraotee ...	1,99,885	1	...	5	564	223	99	409	223	54	...	1	2	1,581	7·9
2	Ellichpore ...	3,67,529	1	3	1	448	474	105	214	388	73	4	...	1	1,712	4·6
3	Woon ...	3,43,228	...	...	...	63	253	266	529	397	198	34	...	...	1,740	5·0
4	Akolah ...	4,88,113	5	64	119	591	335	133	664	544	152	6	2	...	2,615	5·3
5	Booldanah ...	4,00,095	2	1	13	...	46	127	1,010	609	151	50	...	...	2,009	4·9
6	Bassim ...	2,75,764	1	2	1	93	54	40	221	457	220	70	15	116	1,290	4·6
	TOTAL ...	20,74,614	10	70	139	1,759	1,385	770	3,047	2,618	848	164	18	119	10,947	5·2

Deaths from cholera in each District of the Punjab during each month of 1869.

District.	Population.	Number of Deaths in each Month.												Total.	Ratio of deaths per 1,000.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
Amballah	1,008,952	3	2	2	6	10	8	4	3	4	6	...	...	48	0·05
Amritsur	832,750	5	6	6	8	21	44	613	2,653	224	23	4	1	3,608	4·33
Bannu	287,547	...	...	...	...	...	...	...	...	1	7	71	45	124	0·43
Delhi	602,633	1	1	...	2	10	16	11	1	1	3	...	1	47	0·08
Dera Gaji Khan ...	305,903	...	...	...	...	2	...	..	...	...	...	...	..	2	0·01
Dera Imail Khan ...	389,533	...	...	...	...	1	...	...	1	...	..	...	...	2	0·01
Ferozepore	533,416	...	...	...	...	4	1	7	1	...	7	...	...	20	0·04
Goojranwallah ...	550,576	2	5	6	2	6	..	11	24	22	6	1	4	89	0·16
Goojrat	616,347	...	2	3	11	14	9	9	7	...	1	2	3	61	0·10
Goordaspoor	906,126	1	...	2	6	2	5	1	92	45	...	...	1	155	0·17
Goorgaon	690,522	1	2	7	6	15	35	59	141	143	216	11	...	636	0·92
Hazara	364,324	...	...	2	1	...	...	1	3	1	2	1	1	12	0·03
Hissar	484,681	...	1	...	2	1	3	45	142	69	38	...	...	301	0·62
Hoshiarpoor	938,890	1	1	1	7	6	2	...	3	2	4	...	...	27	0·03
Jullundhur	783,020	...	...	4	...	...	...	1	4	...	...	...	...	9	0·01
Jhelum	500,988	...	...	...	2	2	1	1	1	...	...	...	...	7	0·01
Jhung	348,027	...	...	...	...	...	...	...	...	...	...	...	1	1	0·00
Kangra	744,162	2	5	5	4	9	13	9	6	9	5	3	8	78	0·10
Kurnal	610,927	1	2	5	6	2	8	3	3	5	2	1	1	39	0·06
Kohat	140,209	...	...	...	...	...	...	...	...	1	499	8	...	508	3·62
Lahore	775,551	1	1	2	2	10	8	12	133	121	6	1	..	297	0·38
Loodhiana	583,445	...	2	2	2	3	1	1	2	1	3	1	1	19	0·03
Montgomery	359,437	...	...	...	...	...	16	...	...	...	...	...	...	16	0·04
Moozufferghur. ...	295,547	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mooltan	459,780	...	...	...	...	...	...	...	...	2	...	...	...	2	..
Peshawur	498,479	...	...	1	6	4	1	...	2	1,704	1,155	99	13	2,985	5·99
Rawulpindee	699,647	...	...	...	...	2	...	...	...	2	9	...	...	13	0·02
Rohtuck	536,995	...	1	...	...	15	20	7	3	..	...	...	...	46	0·08
Shahpoor	368,796	...	...	...	...	1	...	...	...	...	...	...	...	1	...
Simla	26,402	...	...	...	...	...	...	...	1	1	...	..	...	2	0·07
Sirsa	210,795	...	...	...	...	1	...	...	6	26	38	1	...	72	0·34
Sealkote	994,458	...	1	3	3	3	3	2	6	7	3	...	...	31	0·03
TOTAL ...	17,448,865	18	32	51	76	144	194	797	3,238	2,391	2,033	204	80	9,258	0·53

CHAPTER II.

EXAMINATION OF SOME IMPORTANT QUESTIONS CONNECTED WITH THE HISTORY OF THE EPIDEMIC.

The information regarding the epidemic is imperfect.

149. The chief facts connected with the outbreak have now been narrated so far as they have been ascertained. Information regarding epidemics in India is still very imperfect, especially as concerns the general population, but the efforts which are being made to effect a more accurate registration of deaths have already done something to advance our acquaintance with the extent and progress of disease among the people, and these records from year to year will become more trustworthy and valuable. Even as regards the appearance of cholera in military cantonments and jails, where all the facts can be collected with much less difficulty, there are many points on which more strict investigation is required than has hitherto been usual, and it is very necessary that the results should be carefully recorded on a uniform system. It was with a view to such a collection of evidence that the questions regarding the epidemic as it affected the different sections of the community were issued. The instructions which have been drawn up by the War Office Sanitary Commission in order to attain the same object had not then reached me.

Important questions to be discussed.

150. In considering the history of the epidemic of 1869 and the facts connected with it, the questions naturally arise—Have they in any way added to our knowledge of the disease? Do they throw any light on the manner in which it originates, or the means by which it spreads? Do they show what measures are best adapted to prevent its appearance in any community, or what steps are best calculated to arrest its progress when it has actually appeared? On merely theoretical enquiries I shall not enter. As regards the origin of cholera, it must be confessed that the experience of another outbreak has added little, if anything, to our knowledge of the subject; but there are many practical questions connected with the events of 1869 which may be discussed with advantage, both as regards the evidence which they afford on these important subjects, and also as regards the mode in which such enquiries should in future be conducted, so that they may be more full and complete.

The evidence does not show that cholera was spread over the country by human intercourse.

151. Among these questions we may first consider whether there is any evidence to show that the cholera of the past year was spread over the country by means of human intercourse. On this point many facts have been narrated in the first section, and it must be admitted that, as a whole, they are very much at variance with such an idea. From nearly every cantonment and from every regiment which was stationed in it, as well as from nearly every jail, the statement is made with a sameness which is almost monotonous, that no communication, either direct or indirect, could be traced between the person first attacked and any previous case of the disease. The evidence is by no means perfect, nor is it of such a nature as would justify the conclusion that the cholera was not spread by human intercourse. Such as it is, however, it would favor the opinion that the disease was not disseminated by such means.

The evidence against importation is of necessity chiefly negative.

152. Any evidence adverse to such an opinion must, in the main, be of a negative character. No communication could be traced, but this does not by any means prove that such had not taken place. The facilities for communication even in the case of a jail, where quarantine measures are in force, are very great, and persons affected with cholera

may easily have had indirect intercourse with a previous case, and yet the fact may be altogether unknown. The difficulties of such an investigation are very great and it is open to many sources of error, but no pains should be spared in endeavouring to sift all the circumstances connected with the appearance of the first cases. On this point the great object should be to accumulate facts tested with as great care as possible.

The facts adduced in support of the theory of human intercourse being the means by which the disease is spread are very few.

153. In a few cases the medical officers have expressed their opinions that the disease had been imported into the community under their care, but the grounds on which such an opinion is based in some instances are not given at all, at others they are stated very imperfectly, while in others again they are evidently insufficient to account for what occurred. In some instances, such as the escape of the Allahabad Central Prison, concurrent with a rigid system of quarantine, there is negative evidence to favor the idea that the disease is spread from man to man; but, taken as a whole, the facts which can be gathered from the general history of the epidemic in support of the theory of human intercourse as the means by which cholera covers the country are very few, and wanting in that precision which is so essential before they can be accepted in the way of evidence.

The statements regarding importation should be strictly investigated at the time.

154. It is very desirable that all statements bearing on this most important point should be carefully sifted on the spot without delay, and that the whole question of importation should be strictly investigated whenever any case occurs. But, in order that this investigation may be satisfactory, it must embrace several points which are apt to be lost sight of. When cholera appears to have been due to importation, it is essential that all the details regarding the circumstances should be most fully stated, the name of the person by whom it would appear to have been brought, with minute particulars regarding the place from which he has come, the history of the disease in that locality, the mode of travelling, the time occupied on the journey, and the period after its termination at which he was attacked. Nor is it sufficient to show that an individual after coming from an affected locality was seized with the disease. It is necessary, in order to prove importation, that it should be shown first that, previous to his arrival, no case had occurred in the locality or neighbourhood to which he has come, and also, in the second place, that some connection existed between this imported case and those which subsequently occurred. These are points which are often not enquired into, and it is assumed that, because the epidemic became evident after the seizure of a person who had come from a place where the disease was prevalent, the evidence of importation is complete. If there is reason to suppose that the importation has taken place by means of merchandise or in any other indirect channel, the facts must be examined and tested in similar detail.

The difficulties of making a thorough examination of them are very great.

155. The difficulties which must be overcome in attempting such a thorough investigation are doubtless great, but unless they are admitted and faced, no satisfactory results can be attained. The occurrence of a case of cholera in a city or bazaar is often concealed; the friends of the person are afraid of interference, and deny that any one in their house has suffered from the disease. Difficulties in this way arise from the unwillingness of those who are more immediately concerned to aid in the enquiry, but there are other difficulties which have their origin in the apparent desire of native officials to collect evidence which will suit the views of their superiors. On this account any data collected by the Police must be thoroughly examined before they are regarded as facts, and it is of the greatest importance that their minds should be disabused of the idea that evidence on one side of the question will be more acceptable than evidence on the other. Preconceived theories must be entirely set aside, and an accurate record of facts alone sought for.

Preconceived theories are incompatible with an impartial examination of the facts.

156. There are two theories in particular which are apt to interfere with such an impartial investigation. The first of these is that cholera is a communicable disease, that it can spread only from man to man either directly or indirectly, and that, therefore, one case of cholera must have been derived from some previous case. Others again are impressed with the belief that cholera is endemic within the limits of the place where they reside, and this is an opinion which is not confined to the Lower Provinces, but which has also been expressed by observers in all parts of the country. In their view of the case the elements for the appearance of cholera are ever present, and only require favoring circumstances to bring them into action; it is not therefore necessary to search for any evidence of importation to account for the facts. Either of these views may be correct, but if the history of any epidemic is to be fairly considered, it is indispensable that both of them should, for the time at least, be entirely set aside.

Importance of an accurate record of the exact date on which the first case in each locality occurred.

157. On the question of importation there is no more valuable evidence than the exact date on which the first case occurred in each locality. On this point information was particularly desired, and I proposed with all these facts before me to show the distribution of the epidemic according to the time at which different parts of the country were attacked. But it is evident that no data on this head could be of any use unless all sections of the community were included, and the evidence to be obtained regarding the general population is still too inaccurate for the purpose. I shall not, therefore, attempt to frame any chronological history of the epidemic; but the facts, so far as they can be accepted, go to show that very wide tracts of country were covered with the disease at or about the same time, and that it appeared almost simultaneously at various and distant points of the same area.

No evidence regarding communicability is to be obtained from the number of attacks among the attendants on the sick.

158. Nor is any satisfactory evidence in favor of the communicability of cholera to be obtained from the experience of the attendants on the sick during the epidemic. In some instances, as at Peshawur, the number of those who were attacked was considerable, but in other places all of them escaped. There is no uniformity in the results. At some stations, such as at Morar, communicability appears to account for a sequence of several cases following close one on another, but the immunity which attendants on cholera patients preserved at the same station tells strongly in an opposite direction. Here, again, all that can be done for the present is carefully to note the facts, to show how many different persons came in immediate contact with the sick in the capacity of friends or of servants; how many of these were attacked, and what proportion the ratio of attacks among them bore to that among those who were not so employed. The particulars regarding each case should also be very carefully examined, the degree of exposure, the length of time after exposure at which the disease showed itself, and all other details likely to exercise any influence in the matter.

Was the spread of the epidemic due to water tainted with cholera discharges?

159. Having considered the general question of importation in the light of the facts of 1869, the next important point which deserves consideration is—how far is there any evidence to show that the spread of the disease was caused by drinking water which had been polluted with cholera discharges? Here again there is much information which is imperfect, and there are many points which require further elucidation. In the case of several of the places which suffered most severely from the epidemic, the spread of cholera at first sight would be easily explained on the assumption that the water-supply, which is notoriously open to pollution, had been contaminated with some specific poison derived from the discharges of a person suffering from the disease. This remark applies particularly to Umritsur, Peshawur, and Kohat, where the outburst was most violent, and where the

water-supply at the same time is most open to objection. The question is of so much importance that it will be necessary to examine the facts connected with the spread of the disease in each of these places somewhat in detail.

At Umritsur the facts do not point to water contaminated by cholera discharges as the means by which the disease spread.

160. At Umritsur the people draw their water from wells. Regarding them the special committee which was assembled by the Government of the Punjab to report on the epidemic, as it affected this city, has declared that they are not only universally contaminated with dangerous matter to a greater or less degree, but that the springs themselves into which new wells might be sunk are impure and unfit for drinking. There would be nothing improbable in supposing that a person coming to Umritsur from an infected locality had been seized with cholera, and that some of the discharges, either by means of soiled clothes, or in some of the many other ways which are consequent on the ordinary habits of the people, may have found access to a well. But does the history of the epidemic accord with such an explanation? A few doubtful cases had been registered in Umritsur during April and May, but it was not, as already stated, until the 27th of that month that the Civil Surgeon was satisfied that genuine cholera existed in the city. On that day he found three people suffering from the disease in the quarter known as Kurm Sing's Kuttra. But there is no evidence to show that its further progress was confined, or even chiefly limited, to the inhabitants of this or any other particular quarter, or to persons drawing their drinking water from any particular well; on the contrary, the special committee states, as the result of their investigations, that during June cholera diminished in the Kurm Sing's Kuttra; that during that month it was confined to no particular quarter of the town, but that isolated cases occurred in all directions.

The experience of the prisoners at Umritsur rather favors the opposite conclusion.

161. The experience of the prisoners at Umritsur during this epidemic affords very valuable data. The jail, as already stated, is within the city walls, and the external circumstances, as regards site, drainage, &c., are thus practically the same. But as regards the water-supply there was an important difference. It was drawn from a well within the jail; it was reported to be of good quality, and the Civil Surgeon is of opinion that it could not have been contaminated by any cholera discharges. But to make sure, as far as possible, that any danger arising from this quarter might be obviated, all the drinking water was *boiled* and *filtered* before being used; and yet seven cases of cholera occurred among the prisoners, of which six were fatal. Comparing the deaths in the jail from this cause with those which were reported in the city, they show a ratio of 13 compared with 22 per 1,000. Had the poison been conveyed through the drinking water, a much more marked difference might have been anticipated. It might have been expected that the jail would have altogether escaped. The prisoners were well fed, well housed, and well clad, and the general sanitary condition within the walls is much more favorable than what exists in the town generally.

The facts of the Peshawur epidemic tend in the same direction.

162. The circumstances of Peshawur as regards water-supply are peculiarly favorable for the spread of any epidemic which can be diffused by such a medium. The chief source from which that used for drinking is derived is an open cutting from the Bara river which flows through the cantonment, skirting close to latrines, and subject to every form of pollution, as already described. Cholera discharges might find their way into such a channel with the greatest facility, but there is no evidence to show that the introduction of any such matter, however possible and even probable, was the means of disseminating the disease. The Native troops all drank from this stream; they prefer this water to that of the wells, and yet they did not suffer to the same extent as the Artillery or the 104th Regiment, whose supply was carefully taken from Mackeson's well, as the purest source from which it could be obtained. The 36th Regiment drank of the stream water, and they

certainly suffered more than any other European Regiment at the station, but they suffered in proportion to their strength almost in the same degree as the wing of the 104th Regiment, which remained behind in the valley and which drank from the well. In the 36th Regiment the attacks were in the ratio of 245·35, and in the wing of the 104th 244·60 per 1,000, the advantage being very slightly with the 36th. In regard to deaths the wing of the 104th suffered most, for the mortality was 151·07 per 1,000, as compared with 143·78 in the 36th. These figures do not favor the supposition that the water of the stream from which the 36th drank contained the specific poison of the disease. Great part of the cases in both these bodies moreover occurred when in camp, away from their ordinary source of water-supply, and separated from each other by a number of miles.

At Kohat there is no evidence of any such contamination.

163. The water-supply at Kohat appears to be of very much the same character as it is at Peshawur. Naturally of good quality, it runs along an open drain or cutting, and is very liable to pick up all forms of impurity in its course. The two facts are indisputable—that the drinking water is most impure, and that the troops at Kohat suffered from cholera to an extent which is extremely rare among Native soldiers. But there is no evidence to show that the water was the cause of the disease, much less that the dangerous element which it diffused had been derived from cholera evacuations.

Nor is there in the general history of the epidemic over the country.

164. At Umritsur, Peshawur, and Kohat circumstances at first sight favor the idea of the water-poisoning theory, but the general history of the epidemic presents very few other facts which can bear such a construction. In the case of the Police at Hazareebaugh and in the jail at Patna, as already detailed, the history of the attack pointed to its connection with the use of impure water, but there was no evidence that the impurity which apparently proved so deleterious in its action was the product of any previous case of cholera. The general history of the epidemic over the country, and the details of what occurred at such stations as Allahabad, Lucknow, and Morar, in all of which the troops lost heavily from cholera, is opposed to such an idea. In every one of these stations the water is derived from wells, it is reported to have been of good quality, and to have been carefully defended from pollution. In none of them were the persons who drank from any particular well specially liable to attack, and it is hardly conceivable that the many wells which exist in these cantonments should all have been subjected at or about the same time to the admixture of a special poison resulting from the accidental access of cholera evacuations.

The unprotected state of the wells extremely apt to allow impurities to enter them.

165. Although such an accident is extremely improbable, it must be admitted that even wells in their present unprotected state are extremely liable to receive impurities which may come from many different quarters. Their open mouths allow organic particles to be blown into them, and the way in which the water-carriers still continue to draw from them by standing over them and allowing any surplus to fall back again over their feet, is another great source of danger. In considering the question of any specific germ being introduced into the water and thereby spreading the disease, this extreme liability to pollution, which all sources of water-supply in this country are subject to, must be taken into account. The mode of distribution is also another source of danger. The *bheestee* has generally but one skin for conveying water, and in this he may fill at one time what is used for drinking, and at another what is employed for bathing or other purposes, and which may have been taken from less carefully guarded sources; and in this way the better water may be rendered impure by having been conveyed in a skin which has been contaminated with other water, and which no doubt always contains a certain amount of residuum from the previous load. Arguing on

this fact, it may be supposed that at Peshawur, although the Artillery and 104th Regiment drank water from Mackeson's well, it was brought in skins which had doubtless been filled from the neighbouring stream in order to supply water for bathing and washing, and that, therefore, no pure water could ever be obtained from them. This source of fallacy must be admitted, but it does not affect the general results already mentioned.

These remarks apply only to the alleged spread of cholera by means of water said to contain the specific poison of the disease.

166. The foregoing remarks are not intended to apply to the general question of the connection between an impure water-supply and the prevalence of cholera, but only to the connection between the drinking of water polluted by discharges from a case of cholera, and thereby containing, as some believe, a specific poison or germ, and the subsequent dissemination of the disease. Of the value of a pure water-supply as one of the most important conditions required to preserve any community from cholera and from disease generally there can be no question, and on this subject I shall have more to say in the concluding section of this report.

More detailed information required as to the effects of water-supply drawn from different sources.

167. In any future epidemic special care should be taken to obtain as much information regarding the effect of the water-supply as can be collected. The apparent sources of danger should be noted, as far as they can be estimated, by the situation of any well or stream, with the nature of the surroundings, and the amount of organic matter should be determined at the time by a rough analysis. The number of people supplied from each distinct source should be ascertained, and a record kept of the number using each supply who were attacked. The water believed to be the purest ought, of course, to be selected for use, but where the quality of different wells appears to be equal, it is possible that the statistics of a cholera epidemic may afford valuable information for future guidance.

Much still remains to be done to improve the sanitary condition of Military cantonments.

168. In connection with the water-supply, the general sanitary condition of our military cantonments naturally claims consideration, and here it must be admitted that although much has been effected, especially of late years, much still remains to be done. In many of them the drainage is very imperfect; yet there is no improvement which is likely to prove of more essential benefit in India, as thorough drainage not only of the cantonment itself, but also of the surrounding country. Barracks have been erected which will bear favorable comparison with any such buildings in the world, but without thorough drainage these alone can produce but little results in diminishing the ratios of sickness and mortality among the troops.

The position of cantonments near large cities presents a great difficulty in the way of sanitary improvement.

169. Intimately associated with the sanitary condition of the cantonments themselves is the state of the bazaars which lie within them or on their outskirts, and of the large cities which so frequently exist close beside them. Although in some parts of the country these show considerable improvement, compared with what they were in former days, they still abound in the greatest defects, and their very existence presents the most formidable obstacle to placing the sanitary condition of our stations on a satisfactory footing. For political and strategical reasons, our cantonments have generally been placed in the immediate neighbourhood of large cities, so close that the men have easy access to them, and are therefore subjected to sources of disease which might otherwise have been avoided. It is quite clear that in many instances the improvement of the cantonment alone is altogether insufficient; the city also must share in any such scheme, or the evil will be but half met, and yet the difficulties of providing for the water-supply, conservancy, and the many other sanitary wants of a large city are very great. In many cantonments a still more formidable evil has been allowed to arise. Under the name of bazaars, towns of considerable size have grown up

within the limits of cantonments, and the supervision of these adds very greatly to the difficulty of the sanitary administration of the cantonment itself. Such evils will be prevented for the future, but their existence in not a few stations appears to be almost beyond remedy.

Preventive measures adopted.

170. So far we have been occupied with a discussion of the circumstances connected with the spread of cholera; the next question of importance concerns the measures which were adopted to check its progress. It has been mentioned that quarantine was attempted at one or two cantonments. Meean Meer, where it was merely nominal, escaped; Kohat and Bunnoo, where local circumstances enabled the authorities to enforce stringent measures of this nature, were both attacked. These facts do not afford a basis for any satisfactory conclusions. Both with regard to the effect of such attempted isolation and of the careful disinfection and safe disposal of evacuations which seem to have been generally practised, there is no evidence to show that any results can be properly attributed to them. On these points nothing further need be said, but the great question of vacating infected buildings, and of moving into camp as a means of checking the disease, requires careful consideration.

The effect of moving into camp generally is favorably spoken of.

171. In the first section of this report, very many instances have been given in which the most favorable testimony has been borne to the beneficial effects of the immediate evacuation of affected buildings and of moving into camp; and this testimony has not been confined to the case of European troops only, but extends also to Native soldiers and prisoners. Some instances have been cited in which no movement was made, and yet the disease ceased after a few cases; others again are given in which, although favorable results followed the change, it could not be said that they stood in the relation of cause and effect. Taken generally, however, there can be no question that the opinion of observers during the late epidemic was decidedly favorable to movement.

Great loss of the 58th Regiment at Allahabad in spite of movement.

172. In some cantonments, however, or in the case of some particular Regiment quartered in that cantonment, the results have been very unsatisfactory. In this category may be included the 58th Regiment at Allahabad, the 62nd at Lucknow, the 1-7th at Saugor, and the garrisons of Peshawur and Kohat. It will be advisable to consider briefly what occurred in each of these unfavorable instances. The 58th Regiment was particularly unfortunate. The first case appeared among them so early as the 22nd of February; a month afterwards the epidemic commenced, and, excepting the lull which occurred in the end of June and earlier part of July, it continued till the middle of August. During all this time the Regiment suffered with more or less severity. There was never the same violent outburst of the disease which was seen at Peshawur, or even at Lucknow, but during about five months cases were constantly occurring, and the total loss from cholera alone, including men, women, and children, was very great. Yet in reply to the question, whether, in his opinion, moving from the infected building had any influence in checking the disease, the medical officer replies without any qualification that "in all moves the disease was checked;" on return to barracks it soon reappeared. The severe loss of the Regiment is to be attributed, not to the failure of moving into camp as a means of arresting the epidemic, but to the fact that the disease so long and so persistently clung to the cantonment.

Also of the 62nd Regiment at Lucknow.

173. The portion of the 62nd Regiment which moved into camp suffered severely. The facts are thus stated by the medical officer:—"On the 1st August the E. Company and band marched to the Alumbaugh, distance four miles. On the 4th August the B. Company and the occupants of No. 6 married quarters; no cases occurred on the day of their going into camp. Subsequently one admission on the 2nd and nine on the 3rd—seven proved fatal. On the 4th eight admitted, five died; on the 5th three and two deaths; on the 6th three and

three died; on the 7th three and two died. On the 9th moved to Shahpore, distance eight miles, by elephants and doolies; one case admitted and died; on the 11th three admitted; on the 28th one admitted and one died." There were three circumstances which were very unfavorable to this Regiment. In the first place they were new to the country, having landed in February, or only five months previous; secondly, they had a large proportion of young and delicate recruits; and thirdly, the movements were not made with sufficient promptitude. In several cases buildings were not vacated until two, three, four and even five cases had occurred in them. The other movements at Lucknow, which were made immediately the disease showed itself in any locality, were much more satisfactory.

And of the 1-7th at Saugor.

174. Of the 1-7th Regiment at Saugor, only one detachment, 120 strong, moved into camp, and in their case subsequent events were very disastrous. The details have already been given in the first chapter. The failure in this case must be admitted, nor can it be explained by any such circumstances as have been adduced in the case of the 62nd. The 1-7th had been some years in the country, and the building from which this detachment marched was evacuated after the second case occurred. Either the detachment, notwithstanding the early movement, had imbibed the disease before leaving the cantonment, or perhaps, instead of escaping the influence which was at work in the building which they had left, it may, as the Surgeon supposes, have encamped on a spot in which this influence was as morbific or even more so.

The movements of the European troops within the Peshawur valley were generally unsuccessful.

175. The escape of the left wing of the 104th Regiment to the Cherat hill with only three cases of cholera has already been described. The troops which remained in Peshawur were unfortunate, and the movements which were made within the valley were not attended with success. Both the 36th and the right wing of the 104th suffered very severely in camp, and in the Batteries of Artillery the losses were heavy in proportion to the small number of men out of which they took place. To whatever influence the disease was due, it is remarkable that it should have culminated in nearly all the different bodies of troops, whether in the cantonments or in camps, and also among the Native population of the station on one and the same day, the 19th September. This is well seen in the annexed statement, from which it also appears that the day on which the cholera attacked the cantonments and camps and bazaars with so much virulence, it also acquired increased power in the city.

Statement showing the comparative daily prevalence of Cholera among the Troops and in the City and Bazaars of Peshawur during the epidemic of 1869.

Dates.	City.	Cantonment Bazaars.	Artillery.		38th Regt.		104th Regt.		19th B. C.		3rd N. I.		19th N. I.		25th N. I.		28th N. I.		Total.
			Cantonment.	Camp.	Cantonment.	Camp.	Cantonment.	Camp.	Cantonment	Camp.	Cantonment.	Camp.	Cantonment.	Camp.	Cantonment.	Camp.	Cantonment.	Camp.	
1869.	* D.	D.	* A.	A.	A.	A.	A.	A.	A.	A.	A.	A.	A.	A.	A.	A.	A.	A.	
Augt. 31st	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5
Sept. 1st	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
„ 2nd	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
„ 3rd	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9
„ 4th	10	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12
„ 5th	15	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	19
„ 6th	33	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	37
„ 7th	35	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	41
„ 8th	27	4	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	32
„ 9th	43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	43
„ 10th	58	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	65
„ 11th	39	10	1	...	1	...	3	...	...	...	...	...	1	...	...	...	3	...	58
„ 12th	90	14	7	...	...	...	1	...	1	...	...	...	1	...	...	...	2	...	116
„ 13th	73	19	3	...	1	...	3	...	1	...	...	...	...	...	...	...	2	...	102
„ 14th	80	17	3	...	...	...	1	1	1	...	...	...	...	...	...	...	...	...	103
„ 15th	69	19	3	2	2	...	1	1	...	...	...	...	1	...	...	...	...	...	98
„ 16th	72	13	...	1	...	...	2	...	...	1	...	...	1	...	...	...	...	...	90
„ 17th	62	26	2	3	1	...	...	3	...	...	...	...	...	...	...	...	2	...	99
„ 18th	62	17	1	...	29	...	7	16	...	...	...	...	8	...	1	...	1	...	142
„ 19th	79	42	6	2	29	5	10	27	...	6	2	...	7	...	8	...	...	...	228
„ 20th	66	23	1	...	4	17	4	7	1	1	3	...	3	...	3	...	1	...	134
„ 21st	52	22	...	1	4	5	2	2	2	3	5	...	1	...	4	...	3	...	106
„ 22nd	32	17	6	3	3	19	2	2	...	4	2	...	...	...	1	...	...	...	91
„ 23rd	33	16	3	...	3	3	3	3	1	...	7	...	2	...	2	...	...	1	77
„ 24th	35	22	1	...	4	8	2	...	...	...	5	...	6	...	1	...	...	...	84
„ 25th	33	20	2	...	...	15†	2	...	...	1	4	...	3	...	...	...	...	4	84
„ 26th	24	13	1	...	2	9	...	5	...	1	2	...	...	1	1	...	...	...	59
„ 27th	28	10	2	...	1	...	...	1	...	1	...	...	...	...	2	...	...	1	46
„ 28th	18	10	...	...	1	...	...	1	...	...	2	...	...	...	1	...	...	...	33
„ 29th	15	3	...	...	2	...	...	1	...	2	2	...	...	...	1	...	...	...	26
„ 30th	26	4	...	...	...	...	1	...	...	...	...	...	1	...	1	...	...	...	33
Oct. 1st	19	5	...	...	...	1	1	...	...	...	2	...	...	2	1	...	...	...	31
„ 2nd	20	...	...	...	...	...	...	...	...	1	1	...	...	4	...	1	...	...	27
„ 3rd	20	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	22
„ 4th	22	2	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	26
„ 5th	11	6	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	19
„ 6th	11	3	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	15
„ 7th	7	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8
„ 8th	8	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12
„ 9th	11	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	16
„ 10th	19	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	22
„ 11th	14	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	16
„ 12th	18	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	20
„ 13th	18	2	...	...	1	6	...	...	...	...	...	...	...	...	...	...	...	...	22
„ 14th	3	1	...	1	...	5	...	...	...	...	...	...	...	...	...	...	...	...	10
„ 15th	5	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	8
„ 16th	6	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	9

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* D.—deaths. A.—admissions.

† Twenty-one cases were on this date transferred from "Choleraic Diarrhœa" to "Cholera." After the 16th October only a few dropping cases occurred.

N. B.—These figures are taken from the Regimental Reports.

The returns of the city and bazaar show fatal cases only, and in order that these may represent the proportion of attacks on each day, and also allow of comparison with the number of cases occurring among the troops, the deaths of one day are entered as representing attacks of the day previous. Thus on the 20th the returns show 79 deaths from cholera in the city and 42 in the cantonment bazaars. These are entered as the numbers attacked on the 19th, and in this way a more correct estimate may be formed of the relative prevalence of the disease in the different communities.

A general influence seemed to pervade the valley.

176. On a careful examination of the striking facts connected with the outbreak at Peshawur, and with the remarkable escape of the left wing of the 104th Regiment to the neighbouring hill of Cherat, it is difficult to avoid the conclusion that one general influence pervaded the district, to which all persons within it were more or less subject. The natural configuration of the valley shut in on nearly all sides by hills would greatly favor the localization of any air-borne miasma. A daily register of the deaths from cholera occurring in the different villages would be a valuable addition to the evidence. These particulars are not available, but a general statement which is given by Dr. Ince in his special report of the epidemic in Peshawur shows that the period of greatest prevalence of the disease in the different groups of villages corresponded in great measure with the very period when the disease was most severe in the city and cantonments. It is very desirable that in any future epidemic the daily casualties in each village should be separately recorded.

Particulars regarding the movements at Kohat are wanting.

177. Regarding the movements which were made by the troops at Kohat and the results which appeared to be due to them, I regret that no information is available. The Native Regiments of which the garrison is composed, as has been already stated, suffered with unusual severity, and the changes must have been generally unsuccessful. I have been informed that in one Corps which moved up the stream, and which, therefore, came to a purer water-supply, the disease rapidly disappeared, but that in others which marched downwards the epidemic increased rather than diminished ; but on these and other points of great interest and importance no satisfactory data have been obtained.

Success of the movements at Morar.

178. At Morar the loss in European soldiers was very heavy, and yet the evidence is strongly and unmistakably in favor of movement. The station is more or less encircled by hills, and in this respect somewhat resembles Peshawur, except that at Morar the hills are much lower, and the enclosed valley much smaller. The movements were chiefly made to the top of the ridge, and the situation of the camp on this high ground may perhaps explain, in some measure, the successful results. On seven different occasions detachments of the 103rd Regiment which had been attacked in cantonments marched into tents at this place (Bhundowlie) and were immediately free of any further cases. On four occasions detachments of the Artillery removed from infected buildings occupied either Bhundowlie or another spot on the height called Girgoun. On three of these the disease completely disappeared, and on the fourth only one case occurred.

Moving into camp, although the best means of checking the further spread of the disease which is yet known, is not a panacea.

179. Removal from the locality in which cholera has shown itself, although the best means yet known of checking its further progress, cannot be regarded as a panacea for the disease. A review of the experience of 1869 confirms the opinion which has long been entertained by competent observers as to the advantages of such a procedure, but in order to give it a full and complete trial, it is indispensable that the removal should be effected with the greatest promptitude. The instructions which have been issued with a view to accomplish this object will be considered in the third section.

The principle on which the procedure is based.

180. The fact on which this procedure is recommended is, that cholera attacks particular localities, such as barracks, or even individual rooms, and that the abandonment of these

localities is often attended with a cessation of the disease. The benefits of removal can hardly be explained on the theory of contagion. It frequently happens that a detachment moving into camp suffers during the first day or two, the cases being due apparently to the locality which has been left, and that then without any further movement it remains entirely free from any more attacks. This fact would seem to point rather to a localized influence from which they have escaped than to the power of the disease to spread in any great degree from man to man.

The data regarding the effects of intemperate habits in favoring attack are imperfect.

181. The facts which have been collected with regard to the influence of intemperate habits in favoring attack are very imperfect and lead to no conclusion. Officers frequently attach a very different meaning to the term 'intemperate' from that which is usually accepted, and apply it only to the cases of men who have been brought up for drunkenness. It is a well known fact, however, that those who habitually exceed are often those who never carry excess to the extent of intoxication. On such a matter moreover medical officers speak with a certain degree of reserve. From all these causes the difficulty of obtaining accurate data on the subject is very great. In most cases it is stated either that it is impossible to discover, or that one or two of those who died were intemperate. At Morar it is stated that nine only of all the European soldiers who were attacked were given to indulgence in liquor. "Some of the most steady men died and drunkards escaped." At Allahabad the medical officer of the 58th Regiment gives it as his opinion that "a vast majority of those attacked were of regular and temperate habits."

The results according to age show no uniformity.

182. The data regarding the age of those who died of cholera are definite and distinct, but no conclusion can be drawn from them, except that no one period of life seems to afford any more protection than another. The results during the five years ending with 1867 were given in the report of the cholera epidemic of that year, and it was remarked with reference to them that "all have suffered to nearly an equal extent." The results of 1868 and 1869 are to much the same effect. In the latter year the ratio among men above 30 has been much higher than in those under 20, but the reverse was the case in 1868. The general facts on this head are shown in the annexed statement:—

Statement showing the relation of age to mortality from Cholera among British Soldiers in the Bengal Presidency during the seven years 1863-1869.

YEAR.	Under 20.	20-24.	25-29.	30 and upwards.
* 1863 to 1867, died per 1,000 ...	4·06	5·10	4·60	4·50
1868	4·26	1·22	1·41	2·07
1869	7·72	15·51	14·59	19·14

Regarding the influence of length of residence in India information is still defective.

183. The effect of length of residence in India as influencing the proportion of attacks from cholera among any body of men is a question of much interest and of great practical importance. On this point precise information was called for from each Regiment, and a tabular statement has been received from many of them showing the number of men of certain terms of service in the country and the proportion of attacks among each, but a careful examination of these figures leads to no definite results. In some Corps the men who had lately arrived seem to suffer most, in others they appeared to be no more liable to attacks than those who had been much longer in India. In some cases, as in the 62nd Regiment at Lucknow and the wing of the 58th, which had previously been in the hills, the want of acclimatization appeared to expose the men to greater risk; but the question is one on which further

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* The details of each of these years will be found in the Annual Report for 1867, page 123.

observation is required, and it is very desirable that in any future epidemic careful statistics should be kept with regard to it.

Comparative prevalence and fatality of the disease among men, women, and children.

184. Among men the ratio of attacks from cholera throughout the Presidency equalled 25·7 per 1,000; among women they were 26·1, and among children 25·0. The attacks were thus very equally distributed over the three classes, but it is a remarkable fact, which Dr. Bryden has observed in examining the rolls, that of 63 children whose ages at the time of death were recorded, only one was under one year old. The deaths from the disease equalled 16·46 per 1,000 among men, 16·38 among women, and 18·98 among children. Among men 63·55 per cent. of all those who were attacked died, among women 62·77, and among children 76·06. As shown in the report for 1867 (page 126), the fatality of cholera among European soldiers between 1854 and 1867 had fluctuated between 50 and 75 per cent. of the cases treated. In 1868 the proportion was 65·52, and in 1869, as already stated, it has been 63·55.

Statistics regarding officers are imperfect.

185. The statistics regarding officers are imperfect, and the attempt which was made to obtain more complete data has been unsuccessful. In every station there is a considerable body of officers belonging to the staff or to Native Regiments who are not entered in the returns. Of these several were attacked during the late epidemic. The immunity which officers have as a body preserved has been generally remarked. Taking those stations at which the men suffered most severely, the manner in which officers escaped is worthy of notice. At Morar out of 37 officers belonging to the Artillery and 103rd Regiment, there were two cases of cholera and one death. At Peshawur of 40 officers with the 36th and 104th, three suffered and one died. The returns of the Artillery at this station do not contain the required information. At Lucknow out of 88 officers serving with European troops only one was attacked and one died. At Allahabad the officers, numbering 24, entirely escaped, although the men suffered so severely. It is a remarkable fact, and one which favors the views of those who believe in the communicability of cholera as the great agent by which it is spread, that of the six cases which occurred at these four stations three were medical officers, and all three died—Dr. Hale, of the 103rd Regiment at Morar, Dr. Bell, of the 36th Regiment at Peshawur, and Dr. Dunn, of the 5th Lancers at Lucknow.

Remarkable immunity of Native troops as a body.

186. As usual in epidemics of cholera, the Native soldiers suffered comparatively little from the disease. A comparison between the two bodies at those stations where the Europeans were attacked with the greatest virulence shows the following results. At Kohat, as has been already stated, the Native soldiers were attacked with unusual severity, but there is no European force at this station with which comparison can be made:—

Station.	Admitted per 1,000 of Strength.	
	European Troops	Native Troops.
Allahabad	133	17
Cawnpore	19	2
Fyzabad...	26	...
Lucknow	34	2
Morar	138	16
Jhansie	88	2
Saugor	58	2
Peshawur	187	53

Latrines and barracks altogether fail to explain these differences.

187. In previous epidemics an attempt has been made to explain the remarkable immunity generally enjoyed by Native troops, on the ground—*first*, that they have no latrines; and *secondly*, that they live in separate

huts, whereas the European soldiers frequent privies which are used in common by a considerable body of men, and live together in barracks where numbers are massed together. But such an explanation altogether fails to account for the facts of 1869, and a careful examination of the circumstances of each Native Regiment attacked as regards these two points shows that there is no relation whatever between them and the comparative prevalence of cholera. The details are given in the annexed statement :—

Statement showing the nature of the Lines occupied by Native Regiments and whether the men used Latrines or not.

STATION.	REGIMENT.	CHOLERA.		USED LATRINES OR NOT.	LIVED IN HUTS OR BARRACKS.
		A.	D.		
Dinapore	32nd P. N. I.	15	5	No	Mud huts roofed with tiles, each line being divided into four sections and each section into six huts.
Seetapore	17th B. C.	4	1	" Yes, a good many used and a good many not."	Kutcha huts, two rows for each troop.
Allahabad	XI B. C.	1	1	No	" Continuous lines of tiled buildings."
"	IV N. I.	14	7	No	Four Barracks to a Company
Cawnpore	VI B. C.	1	1	Yes, much used	Twenty-four huts sub-divided into rooms, each room containing two to four men.
"	X N. I.	1	...	Yes, much used	Sixteen huts, arranged in parallel lines.
Lucknow	XXXIV N. I.	...	...	Yes, much used	" Huts called Section Barracks.
Benares	V N. I.	2	2	No	" Sectional hut-barracks, mud walls, tiled roofs."
Banda	Rt. Wing XV M. N. I.	2	...	Yes	" Huts, joined one to each other in a straight line."
Nowgong	Lt. Wing XV M. N. I.	3	1	Yes	" Huts on the Bengal plan for Native Troops. Four squares, 16 houses to each."
Peshawur	XVIII B. C.	31	18	Yes, each man having his own latrine at the rear of his hut.	" Huts, arranged in rows under the same roof, or nearly so."
"	XIX B. C.	22	9	Yes	" Huts, generally two sowars live together."
"	III N. I.	36	20	Yes	" Flat-roofed mud huts, built back to back in continuous rows, each hut containing three to six men."
"	XIX N. I.	43	27	Yes, but used only at night	Mud huts in parallel rows, each intended for two persons.
"	XXV N. I.	24	22	Yes	Barracks.
Jubbulpore	XXI M. N. I.	4	2	Yes	" Four parallel rows of huts matted off into compartments for each man and his family."
Agra	I N. I.	6	3	Yes	Mud huts.

Statement showing the nature of the Lines occupied by Native Regiments and whether the men used Latrines or not—continued.

STATION.	REGIMENT.	CHOLERA.		USED LATRINES OR NOT.	LIVED IN HUTS OR BARRACKS.
		A.	D.		
Agra ...	XL N. I. ...	8	4	Yes	Kutcha barracks divided into four compartments containing from 20 to 23 men in each; the total men in each barrack being from 80 to 93.
Seepree ...	I. B. C. ..	1	1	Yes	Huts.
Jhansie ...	VIII N. I. ...	2	1	Yes	"Three Companies are in 'section barracks;' the remainder in huts, which are arranged in blocks of 20 each."
Nowgong ...	VII B. C. ...	...	...*	Yes	Huts, "built on the Government plan."
Gwalior ...	Scindia's Troops .	*	...	Yes, for married men only ...	Huts, three in each.
Morar ...	22nd P. N. I. ...	13	10	Yes ...	Huts.
" ...	33rd N. I. ...	10	8	Yes, but only partially used...	Huts.
Sirdarpore ...	Bheel Corps ...	10	7	No	"Huts, arranged in double lines."
Augur ...	C. I. Horse ...	4	3	No	"Rows of tiled huts."
Deolee ...	D. Irregr. Force	20	5	No	Huts, one or two men in each.
" ...	II B. C. ...	..	...	No	Huts, one or two in each.
Goonah ...	I. C. I. Horse ...	5	3	No	Every man in the Regiment has a hut to himself.
Saugor ...	40th M. N. I. ...	2	1	Yes, but not always used . .	Huts.*
Kohat ... " ... " ...	3rd. Bat., Art. 1st Regt., Cavy. 3rd " Infy.	190	136	No latrines	No information.

Individual cases illustrative of this statement.

188. An examination of a few of these cases will fully substantiate what has been stated. At Dinapore, for example, the Native soldiers lived in huts and had no latrines, and yet they had more cases of cholera than the Europeans. At Allahabad they suffered much less than the Europeans; the fact that they did not use latrines if taken by itself would favor the theory that the disease was spread by this means, but they had many more cases than the Native troops at Lucknow or Cawnpore, in both of which latrines were used. At Peshawur the Native soldiers frequent such places, and in the past year cholera attacked them with more than ordinary violence. This fact seems favorable to the latrine theory, but at Kohat there were no latrines, and the violence of the outbreak there was much greater still.

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* Suffered very severely.

The immunity of Native soldiers not to be accounted for by their want of susceptibility to malarious influences.

189. The very much smaller degree of susceptibility to attack from cholera which is evidenced by the Native soldiers admits as yet of no satisfactory explanation. It cannot be accounted for on the ground that they are less sensible to malarious influences, for the experience of the past year would itself contradict such a statement. During 1869 fevers were extremely prevalent over a large area of country, but from this disease the Native soldiers preserved no immunity; the ratio of attacks among them was quite as great, and indeed even greater than among the European troops. Reference will be made to this fever hereafter, and the comparative attacks among the two classes compared.

The places which were attacked by cholera were not invariably those which afterwards suffered most in the fever epidemic.

190. With reference to the fever, however, it may here be observed that it was most wide spread and severe, perhaps, so far as regards its appearance in Upper India, the most severe epidemic of the kind of which we have any distinct record. The fact is of importance in connection with the views of those who regard the cause of cholera as something akin to malaria. But it is to be observed at the same time that the places which suffered from cholera were not always those in which fever was most prevalent. The two diseases attacked Peshawur with great severity, fever appearing first, continuing throughout the time the cholera was present, and showing even an increased power after that disease had disappeared. The same occurred at Umritsur, where a low form of fever succeeding the epidemic of cholera proved almost as fatal to the people as the cholera had been. Similar phenomena were observed at other places, but the fever epidemic was by no means confined to the area which had suffered from cholera. At Rawul Pindee, for example, where no cases of cholera had occurred, the troops suffered most severely from fever. The same remark applies to Meean Meer. At Jullunder, where there had been but two cases of cholera among the troops, the cases of fever were extremely numerous.

The comparative immunity enjoyed by the prisoners;

191. Over the epidemic area the prisoners, as a whole, enjoyed a remarkable immunity from cholera. In the Behar Provinces the disease was severe among them, but over the Central Provinces, every district of which suffered much, nine jails entirely escaped, and in six others only one or two cases occurred. In the Punjab out of twenty-nine jails only five were attacked, and in only two of them did more than two cases occur. Contrasted with the ratios of previous years, the diminution of the number of prisoners attacked, even in the year of a widespread epidemic, is very satisfactory, and bears strong testimony in favor of their improved sanitary condition and of the general precautions which have been adopted. Among these the modified system of quarantine which has been enforced may be mentioned. Many medical officers speak of the benefit which, in their opinion, has been derived from this measure, but there is no evidence to show that it had been directly the means of preventing the introduction of the disease.

Illustrated by the experience of the jails in the North-Western Provinces.

192. The great improvement which has been effected in the jails is strikingly illustrated by the statistics of cholera in the North-Western Provinces. In 1860 there were 220 deaths from this cause among its prisoners, 175 of them having occurred in the Central Prison at Agra. In 1861 the numbers rose to 524, Meerut alone contributing no less than 377. In 1862, a non-epidemic year, there were only 34 deaths from cholera in the whole of the jails of the North-Western Provinces, but in 1863 the number was 156. Of the years since 1863, 1869 has the most unfavorable, 88 prisoners having died of the disease; but it is worthy of notice that of the forty-seven jails twenty-seven altogether escaped.

Overcrowding is an evil which existed in many jails during 1869.

193. In connection with the outbreaks in not a few of these jails which were attacked, overcrowding has been alluded to as a condition which greatly favored the disease. The year was one of much distress among the people,

petty crimes were common, and there was thus a very unusual increase in the number of prisoners to be accommodated. The crowding together of persons who have been exposed to privation, and who are therefore in an enfeebled state of health, must be productive of great danger, especially when epidemic disease is threatening, and it is very desirable that such an evil should be met by the construction of temporary huts within the jail enclosure.

The meteorology of the year in connection with the epidemic.

194. The general meteorological history of the year will be considered in a subsequent portion of this report, but it may be mentioned that the local records afford no explanation of the epidemic. Registers of temperature and rainfall have been received from most of the stations, and in those which chiefly suffered, an attempt has been made to find some connection between the appearance and increase of the disease and some changes in atmospheric phenomena, but no such connection can be traced, and it would in no way elucidate the subject to append copies of charts and diagrams from which no deductions can be drawn. A more accurate and extended series of observations at military stations is very much to be desired, especially during an epidemic period. The observations which are now taken at regimental hospitals are frequently very imperfect and inaccurate. The temperature is generally registered by a thermometer placed within one of the rooms, and the results are thereby subject to many sources of error.

CHAPTER III.

THE PRACTICAL MEASURES TO BE ADOPTED FOR THE PREVENTION OF CHOLERA.

General sanitary improvements.

195. It only remains to consider what means ought to be taken for the prevention of cholera. However observers may disagree as regards the manner in which the disease originates and spreads, there can practically be very little difference of opinion as to the general nature of the measures which ought to be adopted for this most important purpose. The most eager supporters of the theory of contagion will admit that quarantine cannot be carried out over the length and breadth of India, that it could never be enforced with sufficient stringency to prove successful, and that its institution would lead to endless oppression and inconvenience. It is only by a thorough system of sanitary improvements that any decided results can be obtained—improvements which shall not be confined to military cantonments only, but which shall embrace native cities and the country generally.

For cantonments.

196. As regards cantonments, I have already indicated what are the chief wants. The importance of thorough drainage has been repeatedly brought to notice, as well as the necessity for improved means for the supply and still more perhaps for the distribution of water. The best mode of effecting these and other important improvements connected with the sanitary condition of military stations has formed the subject of discussion from time to time, and I propose again to consider it at length, with reference to a communication from the Army Sanitary Commission regarding the cholera of 1869. Taking the general history of this epidemic into account, there is little reason to conclude that it was spread over the vast area which it covered by means of water which had been poisoned by cholera evacuations, but the very great value of a pure water supply as a preventive of the disease can hardly be over-estimated, nor the great importance of deriving it from some source removed from human habitations and beyond the smallest suspicion of contamination.

For cities.

197. In many cities considerable progress has already been made in sanitary improvement, but the difficulties to be overcome, whether of a social, an engineering or a financial character, are very great. The Sanitary Commissioners within their respective local Governments and Administrations have been much occupied with this important question. Want of money has hitherto been the most immediate barrier to improvement, but when the bill for enabling municipalities to borrow from the Government in order to carry out such works has become law, one formidable obstacle to progress will in some measure at least be removed.

For villages.

198. In dealing with villages and the country generally, the difficulties are if possible even greater,—the area is so vast, a suitable agency for inspecting and seeing to the removal of sanitary defects so hard to find, and the prejudices of the people so firmly established. The general registration of deaths will, I believe, form a most valuable stepping stone to overcome these difficulties. We shall be able to illustrate the value of sanitary improvements by the great waste of human life which now ensues on their neglect, and although it is no easy matter to overcome the prejudices of a native by facts which relate to even such important matters as life and death, with the spread of education they must exert an influence. Sanitary rules have been issued in all the provinces for the guidance of the people and much may be done by the local authorities in inducing them to

carry these into effect. An interesting experiment in village sanitation is now being tried in the Baraich district of Oudh by Mr. Kavanagh, the Deputy Commissioner, and the results, so far as they have yet been reported, have been encouraging.

Special rules regarding measures to be adopted when cholera attacks British troops.

199. The rules regarding the special measures to be adopted when cholera attacks British troops have recently been reconsidered, and a copy of them as now revised will be found in the Appendix. They have been devised with reference to no theoretical considerations; they are not intended in any way to convey an opinion as to whether cholera is mainly spread by human intercourse, or whether it is not. They merely enunciate the procedure which experience has shown to be the best under the difficult and trying circumstances of the case, and detail the measures which in our present ignorance ought not to be left undone. I am not sanguine enough to believe that the strictest observance of them will prevent severe loss of life, or that they offer any panacea for meeting the danger; but I believe that the result will be comparatively favorable, both in checking the spread of the disease and also in collecting more reliable data for future guidance.

Movement from the infected locality the principle chiefly inculcated.

200. The principle which they chiefly inculcate is the immediate vacation of any building in which a case of cholera occurs. This change would frequently appear to be sufficient to remove the occupants from the infected locality; at other times a march of a few miles seems to be more beneficial, while in a third class of cases a more decided change is requisite. At Peshawur for example, so far as strategical reasons will admit, the troops should be removed from the valley altogether whenever there is good reason to fear that the cantonment will be attacked. At Allahabad, where the disease was persistent for so many months, a transfer to an exempted locality would doubtless have been productive of much good.

Abandonment of infected areas.

201. In June last, when it appeared that cholera was likely to attack the stations in Northern India, I proposed as an experimental measure that in the event of the disease appearing among European troops at Meerut, Agra or Meean Meer, they should be at once removed to the vicinity of Roorkee, of Etah and of Mooltan, places which experience has shown to be remarkably free from the disease. In submitting these proposals it was remarked.—"The benefits of moving into camp have, I believe, been sufficiently established, but the principle it involves might be carried out still further by endeavouring to move away from the infected area altogether.' Our knowledge of the laws which govern cholera is not yet so exact as to enable us to say with anything approaching to certainty what the exempted area in any given case may be, but judging from the facts which are available, and setting all theories aside, there is good reason to hope that by moving troops into the neighbourhood of those places which have hitherto preserved such a remarkable immunity from the disease, good results would follow." The arrangements were approved and sanctioned, but fortunately the stations indicated almost entirely escaped.

Disuse of the terms "epidemic" and "sporadic" as applied to individual cases of cholera objectionable.

202. In the new rules the terms "sporadic" and "epidemic" have not been employed. Much evil has, I believe, resulted from the employment of these terms, and I have no hesitation in stating that they have proved a serious obstacle to a proper study of the disease. When a case of cholera occurs, it is absolutely impossible for any medical officer, no matter of how great experience, to decide whether it is "sporadic" or "epidemic"—that is to say, whether it is a solitary seizure holding a place by itself, unconnected with any other that may have already occurred or with any others that may follow, or whether it is a manifestation of some general influence which threatens to extend. On a merely local view, individual cases may appear to be "sporadic," while an acquaintance with the general history of events will show that to regard them as such is both incorrect and unphilosophical. For example, during the present year individual soldiers were attacked

with cholera at Mooltan, Jullunder, Sealkote, Umballa, Shahjehanpore, and Bareilly. To the medical officers in charge of the regiments to which they belonged, these seemed to be merely "sporadic" cases, and were attributed in nearly every instance to some error of diet or to some excess, but to any one acquainted with the area covered by the great epidemic of the year, they have a much more important significance, and it is impossible to regard them as dependent on the fortuitous circumstances to which they are ascribed. In the same manner, during 1868 individual cases occurred at several stations in Upper India. Here again they were believed and reported to be merely "sporadic," and yet it was the occurrence of these very cases which led Dr. Bryden and myself to warn the Government that a great epidemic was apparently impending—with what truth events have shown. In a study so difficult as that of cholera, it is indispensable that all theories should be set aside, that cases occurring should be regarded simply as cases, and that they should be dealt with as such, the procedure to be adopted being that which experience has shown to be the best, and not made to depend on mere opinions, which must be extremely apt to prove erroneous, and which must vary with the views of individual medical officers.

The term "choleraic diarrhœa" abandoned.

203. In these rules also the forms to be used have been simplified and the term "choleraic diarrhœa" has been expunged. "In deciding on the forms to be rendered," it was observed in the letter submitting the revised rules for the approval of the Government, "two provisos seem to be necessary; *1st*, that at such a time no labor of this kind should be thrown on medical officers and their establishments which can properly be avoided; and *2nd*, that every particular of importance should be noted in such a form that, when the disease has disappeared, the fullest information may be obtainable. According to existing orders, three forms are employed, but they appear to be unnecessarily elaborate. One great cause of this evil is the distinction which has been attempted between so-called "choleraic diarrhœa" and "cholera." I have said "attempted," because no such distinction can be preserved. It is impossible to say where the one ends and the other begins, and the fatality which attends "choleraic diarrhœa" given in returns, shows that many cases have been erroneously entered under this head. Moreover, the greatest confusion often arises from the fact that men admitted with "choleraic diarrhœa" are frequently discharged and transferred to "cholera." The actual dates of attack and all other statistical information are thus rendered inaccurate. No good can be gained by keeping up the name "choleraic diarrhœa," whereas much evil results, not only by invalidating returns, but also by concealing the true significance of an attack, and thereby delaying the important practical measures which ought to be adopted.

Importance of locating European troops in the hills so far as possible consistent with other considerations.

204. The value of the hill stations as a means of preserving European troops from cholera has been strikingly illustrated. Excepting Subathoo, which is not a favorable example, not a single British soldier was attacked at any station in the hills. The question of what proportion of the European army can be located on the mountain ranges is one of great practical importance. If sanitary considerations alone were taken into account it might easily be decided, but Cavalry and Artillery could find no forage on the Himalaya, and there are other most important aspects of the case which cannot be left out of sight.

Importance of concentrating all the statistics of any epidemic.

205. The importance of obtaining accurate information regarding the appearance and progress of cholera can hardly be over-estimated. The institution of registration of deaths among the people is a great advance in this direction, and the data so obtained will prove of much value, but as I have frequently stated epidemics must be studied as a whole, not only as regards every section of the people, but every portion of the country. In a letter to the Inspector General of Hospitals, Her Majesty's British Forces, regarding the

importance of concentrating the vital statistics of European soldiers, I remarked. "Under present arrangements all the information regarding sickness and mortality of European corps serving in the Madras and Bombay Presidencies is compiled in the offices of their respective Inspectors General of Hospitals, and is not known here till many months afterwards, when it appears in the reports of the Sanitary Commissioners and that of the Army Medical Department. Since the facilities of moving over India have become so much greater than they used to be, regiments are transferred from one Presidency to another more frequently than was the case in former days, and with these frequent changes it is impossible satisfactorily to consider the statistics of disease in any one Presidency taken by itself. Moreover, if the course of disease, and more especially of epidemic disease, is to be studied on a scientific basis, and with any hope of arriving at satisfactory conclusions, it is indispensable that it should be considered, not as it affects any one province, but as it affects the whole continent. Cholera, for example, respects no artificial boundaries, and the history of its progress can never be known or recorded unless all the data in the different Presidencies are collected and studied as a whole. In order to be practically useful, the information received by the Government of India regarding the vital statistics of European troops must be complete, and it must be recent. And it would greatly facilitate reference and aid materially in endeavouring to obtain any practical results if it were all compiled and presented on a uniform system."

Accurate statistics regarding officers, much required.

206. Accurate statistics regarding officers are much wanted, and the same remark applies to the Non-military European residents of the country. Much valuable information might be obtained by a careful record of all deaths among these classes, and I purpose to submit proposals for effecting this important end.

Daily registers of the cases in the city, bazaars, &c., should be kept.

207. When an epidemic appears in any locality daily registers of the deaths therefrom should be carefully preserved. The rise and fall of the disease in the city and in the bazaars within cantonments, if daily indicated, will be of great value for comparison with the returns of the troops. The information obtained on this head from Peshawur is of much interest, but at other places, where the disease was very prevalent, the registers are either very incorrect or have not been supplied at all. The Staff Surgeon might be furnished with such statistics daily, to be compiled into one general return at the close of the epidemic.

Instructions for a general enquiry into cholera by the War Office Sanitary Commission.

208. The very full instructions which have been issued by the War Office Sanitary Commission for conducting an enquiry into cholera in India have lately reached me, and the best means of giving effect to their recommendations are now under consideration.

Special investigation by Drs. Lewis and Cunningham.

209. Drs. Lewis and Cunningham, the two officers who were specially deputed to enquire into the mode of origin and spread of cholera, have been busily engaged in their investigations. A report by Dr. Lewis bearing chiefly on the microscopic objects found in cholera discharges and the views advanced by Professor Pettenkofer will be found in the appendix. His experiments, made in order to test Hallier's statements, are of great importance, not only in their relation to the fungoid theory of cholera which the Professor has promulgated, but also as opening up a new field of enquiry in connection with the products found in ordinary evacuations. The facts related regarding the appearance of low forms of life under circumstances in which their occurrence seemed to be almost impossible are of much interest. I shall not, however, forestall Dr. Lewis by giving any summary of these experiments or of the conclusions at which he has arrived. His report is very clear and concise and is illustrated by excellent drawings of the various microscopic objects which he met with. Dr. Cunningham has also

been engaged in a series of very careful enquiries, and his report is in course of preparation. Both of these gentlemen have now been placed in direct communication with this office. The microscopic investigation of disease in India affords a field which is of almost boundless extent, and which as yet has hardly been entered on. The careful enquiries of such painstaking and able observers cannot fail to add much to our knowledge.

A series of observations is now being made in order to test Pettenkofer's theory of cholera.

210. In order to test the views with regard to cholera which have been advanced by Professor Pettenkofer, a series of observations was instituted in the latter part of 1869 on the variations in the level of subsoil water in connection with the appearance or increase of the disease. A simple apparatus has been erected over a well set apart for the purpose in each Military cantonment of any importance within this Presidency, and a daily register is kept of the distance of the water from the surface. At many civil stations also a similar procedure has been adopted. Before the arrangements could be completed the epidemic of 1869 had nearly disappeared, and hence no conclusions can be drawn from the records of that year, but the information which is now being collected on this question of the water level in different parts of the country, and the variations to which it is subject at different seasons, will be of value in the future both for testing Pettenkofer's views, and also as a means of obtaining data which are in themselves of great importance in connection with the increased and diminished prevalence of disease in general.

Arrangements have been made for providing Military authorities with the earliest information regarding a threatening epidemic.

211. Early and full information regarding the appearance and progress of cholera is of very great importance to the Military authorities in the neighbourhood of the locality attacked, both for allowing them time to make preparations and also as assisting them to decide in what direction a movement should be made in the event of the disease appearing among the troops. Under recent orders of the Government the Registration Officer of each group or circle is required to submit as early as practicable reports of all deaths from cholera or any other disease of an epidemic nature in the neighbourhood of Military cantonments, so that the information which they contain may be available to the Officer Commanding. Similar reports are required from officers in medical charge of jails. Early information regarding an epidemic cannot be too widely diffused over the area which is threatened. The authorities are thus placed on their guard and are ready to act with promptness; while at the same time medical officers can watch for the appearance of the disease and institute a searching investigation into the circumstances of the first case.

Early information may eventually enable us to form a correct estimate of the probable course of an epidemic.

212. Early information is valuable not only for such local purposes, but also as a means of endeavouring to form some estimate of the probable course of cholera over the country. The means of drawing any such conclusions with accuracy are still wanting, and, with the exception of Dr. Bryden, no one has ever attempted to say beforehand in what direction an epidemic is likely to spread or what area will probably be covered by it. The remarkable manner in which his predictions on the subject have been fulfilled on many occasions is well known to me, and I feel satisfied that with a more extended and more accurate record of facts, and with the more thorough study of this very difficult question, which these facts will admit of, a more satisfactory knowledge may be obtained of the laws which appear to govern the spread of the disease. The most eager advocates of human intercourse as the great means by which this is effected will admit that, in order to produce an epidemic, something of the nature of which we know nothing is required in addition to the importation of the disease itself. This is a fact which admits of no denial, and even if the theory of human intercourse be admitted as correct, the question still remains to be solved—What are the circumstances which govern the spread of the disease, and do they follow any general course with a regularity which will enable a careful observer to say from its early course

what area will in all likelihood be covered by it? In my report of the Hurdwar epidemic, while admitting the importance of the mass of evidence tending to establish human intercourse as a means of spreading cholera, I also pointed out the great difficulty of explaining all the facts on this theory.

The value of Dr. Bryden's report on cholera.

213. Whatever opinions may be entertained on these very obscure questions, the great services which Dr. Bryden has rendered in the investigation of the disease must be admitted by every thoughtful observer. In recording the various events connected with the cholera of 1869, and the measures which have been adopted with a view to obtain more satisfactory knowledge of any future epidemic, his report on the disease, as it has appeared in this Presidency so far back as statistics are available, must not pass without mention. The data alone which are contained in this work are of the greatest importance, and whether Dr. Bryden's conclusions are admitted as proved or not, the indefatigable industry with which he has collected the facts and the great originality of thought which pervades his discussion of them must strike every one who has studied his report.

Statistics of cholera on board emigrant ships supply some striking facts.

214. The statistics of cholera on board emigrant ships sailing from India supply a special class of facts which have not hitherto been investigated with the attention which they deserve. Details of such vessels sailing from the chief ports were applied for, and although they are to some extent imperfect and probably also inaccurate, the results shown are worthy of record. Between 1843 and 1869 only nine vessels sailing with emigrants from Madras have suffered from cholera. The greatest number of cases in any one instance was 26 out of a strength of 338. In five of these vessels the number varied from a solitary case up to six cases. The disease was not confined to the early days of the voyage. From Bengal to Mauritius a very brisk emigration has been carried on for many years. Between 1850 and 1868, regarding which period statistics have been received, it appears that 431 vessels sailed from Calcutta to Port Louis, carrying no less than 138,036 emigrants. On 75 of the voyages cholera appeared. It was chiefly confined to the first few days after departure. In 57 of them the number attacked was under 10. In only three of them did the number exceed 20, and in these instances the numbers were 21, 23, and 33 respectively. Between the years 1861 and 1869, 126 vessels have carried 50,604 natives of India from Calcutta to the West Indies. In 20 of these cholera has appeared, but in only two of them were more than 5 persons seized out of an average of about 400, the voyage generally taking about three months.

Native Passenger Act of 1870.

215. On the 1st April of the current year an Act entitled "the Native Passenger Ships Act" was passed for the purpose of placing vessels sailing with pilgrims to the Red Sea under more strict supervision. "Native Passenger Ships" coming within the meaning of this Act are not allowed to sail without a certificate to show that they are not overcrowded, and that they are properly provisioned. A bill of health is also required. After receiving these documents such vessels may not receive other passengers without obtaining a fresh certificate. They are bound to touch at Aden, which it was proposed to occupy as a quarantine station pending the selection of a more suitable locality for the purpose. The Commission appointed by the Turkish Government have since selected a place called Hussan Ghorab, about 50 miles to the westward of Makulla. These precautions have been adopted in order to meet the views and recommendations of the Constantinople Cholera Conference. Attention to the sanitary condition of the pilgrim ships is of much importance, but it appears to be very doubtful whether any good can in practice accrue from the quarantine which has been enjoined.

The effect of sanitary improvement in checking cholera within its endemic area.

216. The Army Sanitary Commission in April 1869 suggested that well marked localities in which cholera is endemic should be selected; that a thorough enquiry should be made into their sanitary state; that any defects in this respect should be remedied and the results recorded. In order to carry

out this very practical proposal, I recommended that a few places within the Lower Provinces in which the endemic character of the disease is most marked should be chosen, and that the particular plan of investigation recommended should be conducted in them. Some of the jails in which cholera has been most persistent were specially named as being in every way peculiarly fitted for such an enquiry. The Inspector General of Hospitals of the Indian Medical Department who was consulted in the matter replied that in his opinion the results would be vitiated by the communicable nature of the disease, in virtue of which it might be imported into such a locality. In this view of the case and also on account of the practical difficulties which would beset the accomplishment of any such thorough system of improvement, and which were strongly urged by the Inspector General of Prisons, the Government of Bengal questioned the possibility of giving effect to the recommendations of the Commission. Practical difficulties undoubtedly exist, and they are not easily overcome, but the proposals do not appear to be in any degree complicated by the question of contagion. Indeed the isolation of the community and the other measures of precaution which were deemed essential for the proper trial of the experiment could only vitiate the results. The point to be decided is simply whether sanitary improvements will preserve a community from attack, and reliable data on this point would add another to the many sources of information, by means of which the real extent of the influence of human intercourse in spreading the disease may be tested. The matter is still under the consideration of the Government.

SECTION II.

EUROPEAN TROOPS.

The death-rate during 1869 has equalled 42·89 per 1,000.

217. The cholera epidemic presents the most remarkable feature of the year, and the history of it has occupied so much space that I shall content myself with discussing only the most important questions connected with the general sanitary condition of the European troops during 1869. The results, it may be stated at the outset, have been most unsatisfactory. Out of an average number of 34,624—a strength somewhat in excess of either of the preceding years—there were 1,485 deaths, or a ratio of mortality equivalent to 42·89. Excluding 1859 and 1861, in which years the death-rate was 45·35 and 45·93, the returns of 1869 are more unfavorable than those of any of the last eleven years. In 1859 the army was still, in a great measure, exposed in the field, and in 1861 a great epidemic of cholera passed over Northern India, resembling, both in its prevalence and fatality, the severe outbreak which characterized the past year.

Independent of the loss from cholera, the death-rate has been higher than in any year since 1859.

218. As has been already stated, 16·46 per 1,000 of the total mortality of 1869 has been due to cholera, or not much less than the whole death-rate of 1868, which was 20·11. But even deducting the proportion due to this one disease, the ratio for 1869 still remains 26·43. In 1861, when the annual death-rate was so heavy, 23·73 per 1,000 were caused by cholera, leaving 22·20 to be accounted for by other diseases. Excluding cholera, therefore, the results of 1869 have been more unfavorable than those of any other year since 1859.

The diseases arranged according to the proportion of mortality each occasioned.

219. From fevers, apoplexy, dysentery, and hepatitis the casualties have been more than usually numerous. Arranged in the order in which they have contributed to make up the total death-rate of the year, the various causes stand thus, and the proportion of every 100 deaths due to each is at the same time entered :—

		Died per 1,000 of strength.	*Proportion of deaths out of every 100 deaths.*
DIED IN HOSPITAL.	Cholera	16·46	38·38
	Hepatitis	4·94	11·52
	Fevers	4·71	10·97
	Apoplexy	3·78	8·82
	Dysentery	3·23	7·54
	Phthisis Pulmonalis	2·11	4·92
	Heart disease	1·59	3·70
	Respiratory diseases	·69	1·62
	Delirium Tremens	·64	1·48
	Small-pox	·46	1·08
	Diarrhœa	·32	·74
	Atrophy and Anæmia	·23	·54
	Spleen disease	·06	·14
	Wounds and Accidents	·17	·40
	Dropsy	·09	·20
	All other diseases	1·96	4·58
	Died out of hospital	1·45	3·37
	TOTAL ...	42·89	100·00

Fifty deaths occurred out of hospital, of which 20 were suicides.

220. The details regarding each of the diseases which have chiefly occasioned the mortality of the year will be more satisfactorily considered in connection with the locality in which they were most prevalent and fatal. Fifty deaths occurred out of hospital during the year. Of these, 20 were cases of suicide, 10 men were drowned, and 4 were murdered. The details are given in Table XIII. The number of suicides in 1869 was unusually large, and much in excess of what has been previously recorded. From 1861 to 1868 the number varied from 7 to 13. On four occasions it was 11. In 1869 it has been 20. No explanation has been given of the unusual loss of life from this cause.

The proportion of cases of sickness exceeded that of any year since 1863.

221. Throughout the Presidency the admissions into hospital numbered 59,882, or 1,729·5 per 1,000. In 1859 the ratio equalled 2,228·5, and gradually falling it stood in 1863 at 1838·4. During the last five years it may be said to have gone on steadily declining, and in 1868 it was only 1,438·3; but in 1869 the proportion of cases of sickness has been higher than in any year since 1863. This result has been due chiefly to an excessive prevalence of fevers.

The different forms of sickness arranged in order of prevalence.

222. Placed in column according to their prevalence, the different forms of sickness stand in the following order :—

	Admitted per 1,000 of average strength.
Fevers	750·3
Venereal disease	200·3
Diarrhœa	98·3
Abscess and Ulcer	94·6
Wounds and Accidents	91·7
Respiratory diseases	65·9
Rheumatism	65·2
Hepatitis	52·4
Dysentery	47·1
Eye diseases	26·1
Cholera	25·7
Phthisis Pulmonalis	12·4
Apoplexy	7·5
Delirium Tremens	6·4
Spleen disease	4·0
Small-pox	3·8
Scurvy	1·3
All other causes	176·5
TOTAL ...	1,729·5

Fevers and venereal affections as usual head the list. The relative prevalence of each disease is little altered from that of ordinary years, nor is the actual admission rate of the great mass of the diseases much increased. Cholera shows 25·7 compared with 2·7 in 1868, and fevers have advanced from 462 to 750, or nearly 300 per 1,000.

Sickness was at its maximum in November.

223. Owing to this fever epidemic, of which particulars will be given hereafter, the relative proportion of admissions in each month is very different from what it was in 1868. The ratios at the foot of Table I show that the proportion of cases of sickness commencing with 88·5 per 1,000 in January, advanced with little interruption till it reached 242 in the month of November, and remained at 123 in December. Of the 8,000 admissions into hospital, which took place in November, more than 5,000 were from fever.

The average number daily in hospital was larger than in any year since 1865.

224. Judged by the standard of the average number of men who were daily sick throughout the year, the returns of the past year are also unfavorable. The proportion per 1,000 constantly in hospital equalled 59, or the highest ratio since 1865. Commencing with a minimum of 45·9 in January, it reached a maximum of 78·1 in October. In November it was 72 and declined to 55 in December.

The statistics of the garrison of Bengal Proper were more favorable than those of the army generally in any other of the groups.

225. The statistics of the garrison of Bengal Proper are much more favorable than those of the army of the Presidency, taken as a whole. The death rate was 32·58 as compared with 42·89; the admissions equalled 1,190 in place of 1,729; and the average daily number of sick amounted to 54·7 instead of 59·5. Excepting the 3rd group of stations which, as has been already shown, almost entirely escaped the cholera epidemic, the death rate of the first group is smaller than that of any of the others, and contrasts very favorably with the ratios of 51·16, 64·47, and 39·01 shown elsewhere. The ratio of admissions into hospital is under that of any of the other groups, and is little more than half what it amounted to in the Punjab or in the fourth group. In the average daily number of sick, Bengal Proper occupies the first rank, although the differences here are less marked.

The general health of the garrison of Fort William contrasts very favorably with the results at Dum-Dum and Barrackpore.

226. In this first group only four stations are included—Fort William, Dum-Dum, Barrackpore and Berhampore, and the average strength of these garrisons taken together equalled 1,903. The remarkable immunity from cholera which was enjoyed by the British troops in Fort William has been already referred to, and the excellent health of the garrison as regards relative freedom from all diseases deserves special mention; it contrasts very strikingly with the statistics of the troops at the neighbouring stations of Dum-Dum and Barrackpore. At Fort William during 1869, the death rate was 18·81, at Dum-Dum it was 36, and at Barrackpore 50 per 1,000. The admissions into hospital were 983 per 1,000 at Fort William, compared with 1,310 and 1,450 at these other stations, and the average daily proportion of sick shows an equally favorable comparison. The small body of 154 men quartered at Berhampore suffered considerably, and as the results are only for eight months, they appear to be less unfavorable than they really are. In this group the greatest amount of sickness in any one corps (1384 admissions per 1,000) was in the A Battery, 16th Brigade, R. A., at Barrackpore, and the highest death rate (59·21) in the C Battery of this Brigade at the same station. In the battery in Fort William the admissions were 805, and the deaths only 13·89 per 1,000.

The general results in the second group are very unfavorable.

227. In the second group of stations, chiefly owing to the great prevalence of cholera at Allahabad and Lucknow, the results as a whole have been most unfavorable during the past year. The death rate was 51·16, the admissions 1,443·8, and the daily sick 60·8 per 1,000. Excepting the fourth group, these ratios are higher than those of any of the sections into which the army has been divided in the tables.

Especially at Benares, Fyzabad, Lucknow, and Allahabad.

228. Twelve different stations are included in this group, and omitting Darjeeling, which should be taken with hill stations and depôts, and Chunar, where the strength was very small, there are six of them in which the mortality was excessive, ranging from 30·05 at Benares to no less than 158·13 per 1,000 at Allahabad. The only plains stations in this section in which the loss by death was not very great were Hazareebaugh, Dinapore, and Futtehghur, where the ratios of mortality were respectively 15·17, 21·91 and 15·62 per 1,000.

Several Regiments in this group, and especially the 58th, lost very heavily.

229. The details which are given in Table XVI show how heavily these losses fell on certain regiments. In the 107th Regiment at Hazareebaugh the mortality was only 21·07. In the C Battery of the A Brigade it was

only 7·63, but in two other Batteries stationed at Lucknow it was 51·85 and 83·33. In the 62nd Regiment at the same station it was 105·52. In the D. Battery, XVI Brigade, at Allahabad it was 125·87, and in the 58th Regiment cantoned beside it, the ratio was no less than 184·57 per 1,000. To cholera the deaths were chiefly due, but the loss from other diseases was also heavy, as will be seen more fully when the chief of these are individually considered.

The results in the 3rd group for 1869 are comparatively favorable.

230. In the third group the results of 1869 were comparatively favorable. The death rate was 25·53, the admission rate 1,383, and the daily sick rate 65 per 1,000. But although these figures are satisfactory when contrasted with those of several of the other groups and of the Presidency generally during the past year, they show a much lower standard of health than usual among the European troops quartered over this area, nor is the unfavorable result to be attributed in any great degree to the cholera, the mortality from which was but 1·91 per 1,000. Fever, apoplexy, dysentery, and hepatitis were each more fatal than cholera. In 1866 the death rate was only 15·30; in 1868 it was 18·55; in 1867 it was 48·66, but of this cholera contributed 28·49.

At Meerut and Delhi the returns are the most unfavorable.

231. Omitting hill stations and depôts in this group, the troops at Muttra, Bareilly, and Roorkee show the most favorable returns. In the first the death rate was only 9·52, in the second 12·77, and in the third 16·13. At Meerut, where the deaths from cholera equalled 7·04 per 1,000, the total mortality was 35·19; but at Delhi, where not a single case of cholera occurred, the result is but little less unfavorable, the death rate having amounted to 33·15. At this station, owing chiefly to the prevalence of fevers, the admission rate was very high, and the same remark applies to Roorkee, where, however, in spite of sickness prevailing to an unusual extent the mortality was small.

The statistics of the fourth group of stations are more unfavorable than those of any of the other groups.

232. In the Central India group of stations, the results for 1869 are still more unfavorable than any of those which have been already considered. Out of every 1,000 British soldiers quartered over this area, 64·7 were daily inefficient from sickness, 2,059 were admitted into hospital, and 64·47 died. This mortality contrasts most unfavorably with the ratios of 18 and 24 per 1,000, which are shown in the three years previous. Of the total of 64·47 nearly one-half, 30·18, were due to cholera. To fevers, apoplexy, dysentery, and hepatitis, the other half of the deaths were mainly due.

Excepting Agra the returns from all the stations show badly.

233. At Agra the mortality equalled only 16·76, but at all the other stations the ratio was very high, varying from 30·30 at Seepree to 85·20 at Saugor and 119·74 at Morar. The admission rates at these places show the same disproportion in favor of Agra. There they amounted to 974 per 1,000; in the others they varied from 1,253 at Nowgong to 2,485 at Morar. The returns of individual corps show a very lamentable loss of life. In the 103rd Regiment at Morar this amounted to 81·63; in the 1-7th Regiment at Saugor it was 87·65. The Battery in the Gwalior Fortress lost in the proportion of 138·89, and in one of the Batteries at Morar, the casualties exceeded 185 per 1,000; 23 men died out of a strength of 124.

The high mortality in the Punjab due chiefly to the heavy losses at Peshawur.

234. Over a great portion of the Punjab the admission rate was very high. Omitting hill stations, it ranged from a minimum of 1,355 at Umballa to a maximum of 3,392 at Meean Meer, and it is very remarkable, as will be more fully dwelt on when discussing the wide spread epidemic of fever, that many of those stations which are usually extremely healthy suffered most. At Jullundur, for example, the ratio was 2,632, and at Rawul Pindee 2,472. The death rate for the province, 39·01, was high, but this was chiefly due to an excessive mortality at a few stations. The loss of life at several of them, such as Ferozepore and Sealkote, was small, 7·84 and 10·85; but at

Govindghur, out of a small garrison, the mortality was 136·75, and out of the large force at Peshawur it amounted to 145·68 per 1,000.

The general unfavorable statistics of the province for 1869 must be read in connection with the very variable results at different stations.

235. Taking individual corps there is a very marked difference in the results of the year. In the 20th Hussars for example, stationed at Campbellpore and Sydun Bowlee, the admission rate was only 1,061. In the 85th Regiment at Meean Meer it was 3,597, and in the E. Battery, 19th Brigade, Royal Artillery at Rawul Pindee, it was no less than 4,266. In the 21st Hussars at Umballa the mortality was only 9·73. In the 36th Regiment at Peshawur it was 171·70 per 1,000. In forming any estimate of the general sanitary history of the European Army of the Punjab for 1869, as shown in Table VI, the details regarding individual stations and regiments, as given in succeeding tables, must be carefully studied.

The meteorology of the different provinces should be taken in connection with their sanitary history.

236. Having indicated very briefly the chief facts connected with the statistics of each group of stations for 1869, the meteorology of the different areas which they occupy may now be considered. Our means of becoming acquainted with the meteorological phenomena of India are still most imperfect, but under the supervision of the reporters in each province very valuable data are now being collected. These provinces do not coincide with the provinces of disease which have been adopted by Dr. Bryden. Mr. Blanford's Report of the Lower Provinces for example, includes the whole of the first group—a very much wider area than is indicated by the stations in which British soldiers are quartered, and which, as regards disease, is chiefly represented by the statistics of native troops and prisoners. It also includes a portion of the second, the other parts of which fall to the reporter of the North-Western Provinces, and a similar division of the different areas occurs in other parts of the country. Mr. Blanford's Report is particularly full of interest, and it is very desirable that the main facts which have been recorded by him and the other reporters should be embodied in any general sanitary history of the year.

Meteorology of the Lower Provinces.

Atmospheric pressure.

237. "The atmospheric pressure in Bengal", he observes, "was, on the whole, slightly (about 0·01) lower during the past year than in 1868. The fact, however, taken by itself, is barren of conclusion, since atmospheric movements are determined not by the absolute pressure, but by the differences of pressure in adjoining regions, and these differences are in opposite directions in the two principal seasons of the year. It is probable that the strength of the monsoon in different years will hereafter be found to vary with the amount of difference that prevails on or near the limits of the region over which it blows. But Bengal is but a small tract situated at a distance from either of these limits, and the pressures in Central Asia (or Central India) on the one hand, and to the south of the equator on the other, are not ascertainable at present. * * * *

* * * * * The area here treated of is too small, and the period discussed too short, to allow of more than a probable guess of the chief normal barometric features of the monsoons on the Indian Peninsula, but there is much reason to believe that this triangular mass of land being alternately heated and cooled beyond the seas which enclose it on two sides, while on the north it is in a great measure cut off from Central Asia by the Himalayan Chain, acts on a smaller scale locally and independently much as Central Asia does on the larger scale; and that a subordinate focus of alternately low and high pressure exists over its interior, and determines the course of the local monsoons. That such is the case may be inferred from the known distribution of temperature as laid down in Dove's Charts, and in those more recently drawn up by Messrs. Schlagintweit.* * * *

Temperature.

"The most striking feature of the temperature of 1869, as compared with that of 1868, is its high range in the first five months of the year. At almost every station this excess is manifest, but especially at two, distant from each other, and differing greatly in all the physical circumstances of their position, Port Blair and Berhampore.* * * * * The greatest excess of temperature occurred at Berhampore, and at this station it was at its maximum in May, or immediately preceding the commencement of the rains. But Patna, Hazareebaugh, Benares and Roorkee also show excessive temperatures in May, second only in this respect to Berhampore." * * * * *

"In April and May a mean temperature equal to that which usually prevails at the thermal focus of the Peninsula (Nagpore) was experienced over an area to the west of the Ganges

Delta, including Hazareebaugh, Patna, Berhampore, and probably Gya and Monghyr; of which stations Hazareebaugh showed the highest temperature. This region coincides with that over which low barometric pressure prevailed in the same months, and the former fact goes far to explain the latter. At the same time, the temperatures of Darjeeling and Goalparah were much below the mean, and differed from those of Berhampore and Hazareebaugh by from 10° to 16°,—the difference of latitude, be it remembered, being not more than 2° to 3°, and the mean difference of temperature at this season not more than 5° to 7°. At Calcutta the temperature during these months was about as much above the mean, as during the previous year it had been below it, but it is worthy of remark that the highest temperature of May did not exceed 100, and there were no hot winds. These winds, indeed, the temperature of which in Lower Bengal is sometimes as high as 105°, do not reach Calcutta in all years, and in 1869 there is an apparent reason for their absence, since they come from the heated plains of the North-Western Provinces and Central India, and the region of low pressure of Hazareebaugh and Monghyr would be the focus towards which the winds would tend from all quarters. The heat at Calcutta was generally remarked as oppressive, but this implies something more than mere excessive temperature; generally indeed humid air and a calm atmosphere.* * * * *

Solar Radiation.

"From such a comparison as can be instituted between the data of 1869 and those given in the report for 1868, it appears that the intensity of that portion of the solar radiation which penetrates the atmosphere and affects the exposed thermometer, was generally greater during the earlier months of 1869 than those of 1868. This is especially shown at Hazareebaugh and Patna. At the former station the solar radiation was very intense in April and May,—its mean temperature in the former month being 158°, in the latter 164°,—while on one day the reading was high as 172.° At Berhampore the highest mean of solar intensity was in April, when it was nearly 19 degrees above that of Calcutta and only 8° below that of Hazareebaugh. Monghyr and Patna also gave high means, and at Gya in June the solar heat was nearly as intense as at Hazareebaugh in May. At Goalparah, on the other hand, the mean intensity of solar radiation was 123° only in April and May, that is 8 degrees lower than at Calcutta and 30° lower than at Hazareebaugh (on the mean of the two months.) Thus then the data, imperfect as they are, show the general local coincidence of intense solar radiation with high air temperatures, and *vice versa;* and since the high and low temperatures coincide with low and high barometric pressures respectively, it seems a reasonable inference that the variations of local solar radiation in different years may be the main determining cause of the barometric irregularities described in a previous part of this report. * * * * *

Humidity of the air.

"Except at Saugor Island, Calcutta, and False Point, the atmosphere in the earlier months of 1869 was generally drier than in the corresponding months of 1868. This was especially the case at Berhampore, Jessore, Darjeeling, Patna, and Monghyr, as well as apparently in the North-Western Provinces: and it seems not improbable that it was at least in part due to the deficient rainfall of the preceding year. On the other hand, since the increased siccity implies diminished evaporation, we have here one probable cause of the higher temperature noticed in the previous pages. In the latter months (October, November, and December,) it was generally slightly more humid at the Western Bengal and Behar stations and at those of the North-Western Provinces, and the increased humidity coincided with a somewhat lower temperature, both being the probable consequences of the rain, which fell generally over those regions in the end of September and beginning of October, whereas the rains of the previous year had failed almost entirely. Hazareebaugh seems in some degree to be an exception to the rule, since, while the temperature was considerably higher in the earlier months of 1869 than in those of 1868, the humidity of March and April was also higher. But even here it may be observed that the chief excess of temperature was in February and May, and in both years the siccity and temperature were comparatively great, and the barometer low * * * *

Serenity of the atmosphere.

"As might be anticipated, the Serenity Tables show a very direct relation with those of solar radiation and air temperature, when a comparison is made for stations in the same latitude, and the same month of the year. *Ceteris paribus*, as a general rule, the greater proportion of clear sky, the greater the intensity of the solar radiation, and the higher the temperature.

Rain-fall.

"The rainfall of 1869 was considerably less than that of 1868 in Orissa and the Delta of the Ganges, slightly less in the eastern and north-eastern, considerably greater in the western and north-western circuits. In 1868, as I have elsewhere shown, with the barometric depression in the north-west of the Bay of Bengal, the rainfall was excessive in the western part of the Delta and Northern Orissa, and the vapour-bearing winds were arrested or drawn aside from their usual course towards the highly heated plains of the North-West and the Punjab. We have seen that in 1869 there was a local barometric depression in the elevated country to the west of the Gangetic Delta, and an unusually high temperature during the hot weather months; that at the entrance of the Assam valley the temperature was below the mean and the barometer relatively high, and there was probably a second local barometric depression in Upper Assam. This distribution of pressure did not undergo much alteration during the rainy season, the most important change being a rise of pressure about Hazareebaugh, which, in the latter part of September and the beginning of October, permitted the vapour-bearing winds to pass onward to the North-

Western Provinces and Central India, and thus to save those provinces from the impending disasters of a second year of scarcity, if not absolute famine. * * * *

* The fall was less than the average in Orissa, the Gangetic Delta and Arracan. Also in Eastern Bengal (except Sylhet and *probably* Cherrapoonjee,) in Lower Assam, Sikkim and parts of Behar. It was above the average at Sooree and Berhampore, and over a tract of country stretching between the Rajmehal Hills and the Bhootan Doars, including Dinagepore, Rungpore, and probably Julpigoree and Buxa. The rainfall in Upper Assam seems also to have been in excess of the average, and it certainly was so in Sylhet. In so far as any conclusion from our present data is legitimate, it would appear that the area of greatest rainfall did not coincide with that of barometric depression, but was at 150 miles to the north-east of it. It was very restricted, and in some places, if the data could be trusted in detail, would seem to be sharply defined, *e. g.*, between Sooree and Burdwan; but I am not in a position to say that either of these registers can be implicitly trusted, as their gauges have not been tested. A similar strongly marked difference is shown by the neighbouring stations of Sylhet and Cachar, the rain-gauges of which I have examined, and know therefore to be subject to comparatively trivial errors, while I have full confidence in the general accuracy of their records. But a still more striking difference is that of Calcutta and Howrah; the rain-gauges of which are only two miles apart on opposite sides of the Hooghly. In this case, however, the difference is mainly due to the partial character of the storms in February and March. The relation above remarked between the area of greatest rainfall and that of greatest barometric depression may possibly be due to the operation of a general law, since it had its counterpart in the preceding year. It will be seen, on reference to the report for 1868 (pp. 27 and 48), and to the charts for the months of June and August 1868, that in these two months, when the barometric depression near Saugor Island was most intense, the rainfall was greatest at some distance north of the depression. In June there fell more than 30 inches at Balasore and Contai, near the coast, in the north-west corner of the Bay. Over a larger area around that of maximum precipitation and including Calcutta, Midnapore, Saugor Island, &c., the rainfall exceeded 20 inches, and over another and less definite zone exterior to the above, it was between 10 and 20 inches. Similarly, on the chart for August, a series of concentric zones, centreing at Hooghly, mark the areas of 10 to 20, 20 to 30, 30 to 40, and more than 40 inches, the last mentioned quantity having been registered only at Hooghly. The relation thus shown is remarkable, and has not, so far as I am aware, been noticed before; it is difficult to believe it fortuitous, but if it be constant, its cause is by no means obvious. That a heavy fall should occur where the barometer is lowest might be expected, but it is not clear why zones of rainfall more or less similar in form to the isobaric zones of minimum pressure, should occur at a distance from the former, so that when laid down on the map they suggest the duplicate image of the isobaric lines seen through Iceland spar. The only explanation that occurs to me, and which after all is merely tentative, is that afforded by the greater momentum of the southerly wind, as compared with those which tend towards the barometric depression from other quarters. In virtue of this superiority an ascending stream of air and consequent precipitation might occur to the north of the depression rather than immediately over it. But a wider basis of fact is required to establish the empirical law; pending which, any discussion of reasons and causes must be premature. * * * *.

Winds.

"In 1869, there was an unusual prevalence of southerly winds in the first two months of the year, to which may probably be attributed, in part, the prevailing excess of temperature over the corresponding months of 1868, already noticed at page 34. In May and June the principal deviation from the normal directions is shown in the predominance of westerly winds at Hazareebaugh, north-easterly at Monghyr and of northerly winds at Patna and Benares, which may undoubtedly be attributed to the Hazareebaugh and Monghyr depression; these directions, as well as those of the winds at the Delta stations, being in exact accordance with Buys Ballot's law, with a minimum pressure between the two last named stations. In July and August with the relative rise of the barometer at Hazareebaugh and the contraction of the area of depression, the winds generally drew round more to the eastward, and in September, in the latter part of which month the rains reached the North-Western Provinces in abundance, the general direction throughout Bengal was between S E. and E S E. * * * *.

Storms.

"The year 1869 has been somewhat remarkable for the number of cyclones that have been felt in Bengal or on its coasts. Three of these occurred at the commencement of the south-west monsoon in May and June, and one at its close, in October."

Meteorology of the North-Western Provinces.

238. Dr. Murray Thomson, the Reporter for the North-Western Provinces, divides the year into portions—the early cool season, the hot season, the rainy season, and the cold weather in the latter part of the year. With regard to each of these he makes the following general remarks:—

"The early cool season of 1869, including the months of January, February and March, very much resembled that of 1868: the first three weeks of the period had dry, clear, cold weather; the cold in the mornings of the first two weeks of January being often intense. Cloudy, wet weather was observed from the 20th of January to the 7th of February; the two middle weeks of February had clear skies, but from the 23rd of February all through March, dull cloudy weather was the rule. A good deal of rain fell in the stations between the Jumna and Ganges and to the north of the latter river. The season was a healthy one. There was no prevalence of any disease reported from the observing stations in the North-Western Provinces and Oudh. * * * * * *

"The hot weather of 1869 extended over a period of two months and seventeen days (April, May and the first seventeen days of June). Although it is difficult to separate sharply a period like this either from the latter part of that which precedes, or the former of that which follows it, yet here we have to deal with a period of very high temperature, and in which there was no appearance of the monsoon rains. * * * *

"The barometer stood lower than it had done in the two previous years. In April the temperature was nearly the same as in 1868 and 1867, but in May and the first part of June it was much higher. The whole season was very dry, but not more so than in the other years. But the determination of the humidity of the atmosphere, as at present carried on, is far from being an accurate process; too much reliance, therefore, cannot be placed on the results on which the above statement is made.

"Judging simply from inspection of the hot weather, and leaving instruments out of view, there can be no doubt that it is the driest part of the year. Evaporation proceeds, as may be supposed, with great rapidity: a large body of water will lose as much as half an inch of its depth in 24 hours. * * * * * * *

"The rainy season of 1869 was far from being normal. The hot weather lasted well into June, and no rain fell till in the third week of that month. In July the rain was more frequent, and especially was this the case in the more easterly provinces. The 3rd to 8th, 11th to 14th, and 24th to 28th, were groups of wet days all over the North-West. But, although rain fell thus frequently in July, yet the total falls were generally less than in 1868, which was a year notable for its diminished rains. In August the rainfalls were less numerous than in July, and here again this was more conspicuous in the more western than in the eastern provinces. The amount of rain which fell in August 1869 generally far exceeded that which fell in 1868; in fact, in the latter the diminished rainfall of August was very striking. In September also we had a great contrast between 1868 and 1869. In 1868 the amount of rain, except in the eastern provinces, was very small, while in 1869 it fell frequently and heavily all over the North-Western Provinces. In October the rain was confined to the first eight or nine days, but in these it rained heavily, giving a total fall which contrasted strongly with 1868, when no rain whatever fell. The rain of September and October raised the annual fall to nearly the average amount. The abnormality of the rainy season of 1869 consisted in a postponement of the regular rains rather than a failure in the amount. * * *

"The latter cold weather includes the months of November and December.

"It is in this part of the year, along with the first three months of the succeeding year, that the cold weather exists. In 1869, excepting on the 18th and 19th of December, there was a steady drop of the temperature from the 1st of November to the end of the year; but the decrease of temperature does not stop at this time, but goes on through the first half of January. The barometer rises while the thermometer falls. The cooler any place is it has more air over it, and consequently more pressure or weight bearing on it. The year 1869 showed no exception to this rule; air-pressure increased nearly all through the period. From the 20th to the 25th of December, the only rain of this part of the cold weather fell. This is quite a usual occurrence. The wind had a general westerly direction, except during the period of rain.

Meteorology of the Central Provinces.

239. In the Central Provinces the meteorological observations are under the direction of the Sanitary Commissioner, and the following extracts from his review of the climate of these provinces, which he has furnished me with in anticipation of the appearance of his Annual Report for the past year, will be read with interest.

Stations at which observations are taken.

"Meteorological observations have been recorded throughout the year at the stations of Nagpore, Jubbulpore and Raipore; and at Seoni from the first May. Thermometric observations have also been registered on the Puchmurree Hill from February to November.

Meteorology of 1869 compared with 1868, deduced from observations taken at Nagpore.

"At Nagpore observations have been continued for only two years, and at the other stations for only one complete year. A comparison between the conditions prevalent in the different seasons of the two years at Nagpore will be of considerable interest and value, but in one important point the meteorology of Nagpore in 1869 differed from that of the provinces generally. The rainfall at Nagpore in June and July scarcely exceeded the scanty fall of the previous year and was again far below the average fall of those months in the previous year, which was not the case in any other district except Wurdah. The mean *barometric pressure* was greater in January, February, April, August and November, less in the other months. The mean *temperature* was considerably higher in the first half of the year, *i. e.*, in the spring and hot weather, lower in the rainy season and autumn. The mean *humidity* was less in the first half of the year, considerably in excess during and after the rains. There was less cloud in May, the hottest month of the year; in the autumn the amount of cloud was greatly in excess over the season of 1868. The *rainfall* was less in the spring and hot weather, greater during the monsoon, and this was more especially the case in the months of September and October. In the general *direction* of the *wind* there was no great difference in the two years. The *velocity* of the *wind* was much the same during the hot weather in both years; it was considerably less in the rainy season, greater in October. The amount of *ozone* as estimated by Schöubein's test was generally less than in the preceding year, but greater in June, October and November.

Rainfall.

"In Nagpore, Wurdah, and Baitool the total rainfall for 1869 was somewhat below the average of former years, but in all other parts of the provinces the full average was obtained, and what is of great importance, the later rains were heavier and more prolonged than usual. Consequent on this more abundant rainfall, we have in the later months of 1869, a lower temperature and a greater amount of moisture, the greatest difference in these respects occurring in the month of October.

Humidity.

"Comparing the amount of atmospheric moisture at the different stations, we find that in April and May in all stations the atmosphere attains a state of almost absolute dryness. The greatest degree of dryness was attained at Jubbulpore at 4 P. M., on the 1st and 19th May, when the temperature of the wet bulb was 41·3 below the dry bulb, and at Nagpore on the 11th April when there was a difference between the wet and dry bulb thermometers of 35° at 10 A. M. and 41° at 4 P. M., the relative humidity calculated according to Apjohn's formula being ·08 and ·09 (saturation being = 100). It is, I think doubtful whether our instruments can indicate greater dryness than this. But while the hygrometers at all the stations indicate an extreme degree of dryness during the hot weather, the difference in the effect of the rainy season on the hygrometer in different localities is very great. Thus, if we take the month of July, in which the rainfall was generally the heaviest, we find that although in that month the mean humidity at Raepore was ·81, at Seoni ·80, at Nagpore ·73, at Jubbulpore it did not rise higher than ·53, although the rainfall was greater there than at any of the other stations, and on reference to the hygrometric table for Jubbulpore it will be observed that the humidity did not rise above ·56 in the subsequent months of August and September. This great dryness of the atmosphere at all seasons at Jubbulpore, as indicated by the hygrometer, is the more remarkable when the great prevalence of malarious fever at Jubbulpore is considered.

Wind.

"Centrally situated as these provinces are, an accurate record of direction of the wind is of much interest and importance, particularly with reference to theories regarding the connection of epidemic disease from one tract of country to another by prevailing winds. Being within the tropics, the changes in the direction of the wind as the different seasons come round are very regular. The north-easterly wind sets in October and continues steadily in this direction or easterly through November and the early part of December; in the latter part of that month it slackens and southerly winds are frequent; the north-east wind however continues the prevailing wind till the end of January or beginning of February. In February and March the wind is variable, but southerly and south-westerly winds are more frequent. In April the prevailing wind is north-west, and it continues from this direction until about the middle of June, when the monsoon sets in, the general direction of which is west and south-west; westerly and north-westerly winds are the strongest; the north-easterly and easterly winds are generally light. A clear sky commonly accompanies the north-east and easterly winds, and their comparative dryness is shown by the rapid decrease of the relative humidity. of the atmosphere in the month of November, when these winds prevail with the greatest steadiness, the wind from the north-west is however the driest wind. South and south-westerly winds bring clouds and are commonly followed by electric disturbance and showers. Thunder-storms are commonly frequent in the month of March and beginning of April, but in 1869 their occurrence was less frequent and general than usual.

"The currents of air that traverse Central India differ considerably from those that prevail in the Ganges valley and Northern India, particularly as regards the relative frequency of winds from the south-east and east. In the Ganges valley and the North-West Provinces, south-east and easterly winds are frequent from March till October. In this part of India a south-easterly wind is rare at all seasons. North-easterly and easterly winds prevail in the cold weather; but after February an easterly wind never occurs except for a few hours from some local atmospheric disturbance. Between February and October—the cholera season in these provinces—a current of air that shall reach any part of the Central Provinces from Bengal or the north-west seldom or never occurs."

240. Dr. Neil, the Reporter for the Punjab, gives the following summary of the meteorological observations registered in that province during the year :—

Meteorology of the Punjab.

"The rain-fall for 1869 more nearly approximates that of 1867 than that of the intermediate year, while in many stations, as for example many on the north-western frontier, the fall of 1869 far exceeds those of the previous years. The month of March 1869 was unusually rainy throughout the province, whereas the two succeeding months were very dry, and it would therefore seem that during the first three months of the year the rain had expended itself for a time. During April and May of the two previous years much more rain fell.

Rain-fall.

"During the month of June 1869 the fall of rain was less general in the southern districts than during the same month of the two previous years, whereas in some stations along the north-western frontier as at Mozuffurgurh, Mooltan, Dera Ismail Khan, Dera Gazi Khan, &c., the fall was greater. In July 1869 rain became general between the 4th and 6th, but no heavy falls occurred until after the 15th. There is a very great difference in the time at which the rainy season commenced in the Punjab during July 1867, as compared with the two succeeding years. From the 1st to the 10th of July 1867 rain-fall was very general, but ceased almost entirely till the 19th, and very little fell from the 25th to the end of the month. In the two succeeding years, however, the more general and copious fall seems to have reserved itself till the latter half of the month in each year and then to have continued more steadily and copiously. Matters were reversed in August: for during that month of 1867, rain was more general and more copious than the falls for the same month of the two succeeding years combined. In the month of September 1867 and 1868 rain ceased almost entirely by the 8th; but during the same month of 1869 a heavy fall occurred on the 4th, and throughout the whole month rain-falls were frequent and very general. That this late rain-fall in 1869 had much to do with the great prevalence of fever observed, I make little doubt: during the last three months of each year little or no rain fell until towards the end of December, but more fell then during 1867 and 1868 than during the same period of 1869.

"The mean temperature during the earlier months of the year 1869 was much less in some stations than it had been for the same period during the two previous years. This was more particularly the case with frontier stations as also with Rawulpindee and Sealkote. The months of April and May presented throughout nearly all the provinces an uniformly higher mean temperature in 1869 than during the two previous years. The cause of this is doubtless the smaller amount of rain during these months last year than during the previous periods. The mean temperature of June and July 1869 was on the whole less than during the same months of the two previous years, on account of the greater fall of rain. In August 1869 the mean temperature was much the same as during the same month of the previous year, both being almost uniformly higher than that of August 1867, during which month much rain fell. September 1869, however, shows a lower mean temperature and much more rain than the same month of the two previous years. The cold weather came on more rapidly in 1869 than in the two previous years, and in many stations the minimum temperature was very much less during the last three months of 1869 than in those months of the two previous years. The unusual amount of rain in September 1869 was doubtless the cause of this. The daily range of temperature during 1869 differs in many interesting particulars from that of the two previous years. During the first three months of 1869 a considerable amount of rain fell, especially in March, and consequently the daily range of temperature was less. In some stations indeed the range was, during March, as much as ten, twelve and even eighteen degrees less than during the same month of the two previous years. April and May, however, presented greater ranges, being drier. June and July did not present much difference; but August 1869 on the whole showed a greater range than the same month of 1867 and 1868. Not so with September 1869, however, on account of the greater amount of rain as previously noted. There is not much difference observed in the range during the months of October and November in the years under review, but during December 1869 the range mostly exceeded that of any of the two previous years during the same month.

Temperature.

"During the first three months the wind blew most frequently from directions lying between north and west, but during barometric depression it often came from easterly directions. This was more particularly the case towards the end of January, the second and third weeks of February, and particularly so during the first week of March. In April the wind became more variable, but still most frequently westerly, changing however, as in the previous month, to an easterly direction during great barometric depressions. In May the wind was most frequently northerly often veering round to eastward, as in the two previous years. From this month to the end of September the wind, so far as the records can be relied on, had an easterly tendency, while towards the end of the year it gradually turned northward and westward: such is generally the case in the Punjab. During the most rainy periods (July and September) of the hot weather of last year easterly winds almost constantly prevailed, while in the previous year during the

Winds.

rainy season the winds were very various, to which circumstances is no doubt due the greater scarcity of rain at the proper times."

The importance of embracing the meteorology of India in one report.

241. Mr. Blanford is the only Reporter who attempts a review of meteorological phenomena occurring beyond his own immediate province. In addition to the registers kept at 17 stations in Bengal Proper, he also receives a copy of the observations taken at Port Blair, Madras, Benares, and Roorkee. "The meteorology of Bengal," he observes, "cannot be treated independently of that of other parts of India and the neighbouring seas, and I cannot but express a hope that before long it may be possible to include in one general report the data of a very much wider area." This is a question which well deserves attention. If the observations made throughout the country were all embraced in one general review, there can be no doubt that they would be considered in a much more satisfactory manner and with some hope of arriving at reliable conclusions. The same remarks which have been so frequently made with regard to the statistics of disease in India apply with equal force to the records of its meteorological phenomena. A merely local view of either one or the other must of necessity be imperfect. If these two sets of facts are to be studied on a really philosophic basis, they must be taken as they affect the whole peninsula. The question is one of great practical importance and scientific interest.

Small-pox was more prevalent and fatal than in any year since 1861.

242. The diseases which have chiefly contributed to the rates of sickness and mortality during the year, as they were distributed over the different provinces or attacked individual stations and regiments, will now be briefly alluded to. The history of the epidemic of cholera having already been fully narrated, the first disease of importance which claims attention is small-pox. Among the European soldiers throughout the Bengal Presidency, 130 cases of small-pox were treated during the year, and of these 16 were fatal. The ratios both of admissions and deaths 3·8 and ·46 per 1,000 are higher than in any year since 1861, when they equalled 5·2 and ·96. In 1869 small-pox was extremely prevalent among the general population. On reference to Table X it appears that the unusual number of cases among British soldiers was not confined to any particular group, but appeared chiefly in a few stations of each group. For example, there were 11 at Lucknow, 8 at Meerut, 19 at Agra, 27 at Saugor, 13 at Ferozepore, and 12 at Meean Meer, many intermediate places having escaped altogether.

Revised rules to be observed with regard to tents, &c., used by small-pox cases have been issued.

243. The importance of taking every precaution to prevent the spread of small-pox, when it appears in a cantonment, formed the subject of a representation during the year, and attention was then drawn to the necessity of adhering strictly to the orders regarding the destruction of tents and every other article used by small-pox patients which could not immediately be subjected to thorough disinfection. For the sake of convenience, and in order to avoid any confusion on this important matter, a complete set of rules to be observed on such occasions has been prepared, and is appended to the pamphlet containing the revised rules to be followed on the appearance of cholera.

Fevers have been more prevalent than in any year since 1863.

244. During the year 25,978 cases of fever were treated, and 163 of these proved fatal. The admission rate from this one disease in its various forms equalled 750, and the death rate 4·71 per 1,000. Fevers have been more prevalent than in any year since 1863. They then amounted to 787 per 1,000. In no one of the last five years have they equalled 550, but from 1859 to 1862 the annual admissions varied from 780 to 910. As regards deaths from this cause, the results of 1869 are even more unfavorable, for the death rate of 4·71 is higher than in any one of the previous eight years during which it ranged from a minimum of 2·63 to a maximum of 3·97. The gradual monthly rise in the number of cases of fever from February to November is well seen in Table I, in which the admissions from the whole army are entered.

Fevers were very prevalent in all but the first and 2nd groups of stations.

245. This remark does not apply to Bengal Proper, where there was little fluctuation, but in all the other groups it is very marked. In the second of them. for example, the fever admissions rise from 57 in January to 521 in June, and then declining rise again to 352 and 360 in October and November; but although this marked difference exists, there was no great prevalence of fevers in this group in 1869. In the third of them, the number which was 62 in February was 356 in November. In the fourth and fifth groups the difference is still more striking, and the epidemic was much more severe. In the first of these there were 73 cases in February and 1,107 in November; in the second of them with a minimum of 184 in February there was a maximum of 3,452 in November.

Individual stations suffered much more than others in each of the three last groups.

246. A glance at Table IX shows that not only the two first groups escaped the extreme prevalence of the fever, as a whole, but also that not one of the stations in them suffered in any marked degree. In the third group on the other hand, while the greater number of the cantonments were remarkably free from fevers, the admissions at Delhi and Roorkee were very numerous, equalling in the former 1,309, and in the latter 1,233 per 1,000. In Meerut on the other hand, which lies not far from either of these places, the admissions from fevers amounted only to 277 per 1,000. In the fourth group the ratio at Agra and Nowgong was small, being only 274 and 282, but in all the other stations the disease was extremely prevalent, the cases varying from 556 per 1,000 at Gwalior to 1,864 at Jhansie. In the Punjab, excluding hill stations, the epidemic was widely diffused. Sealkote, Umballa and Campbellpore suffered comparatively little. In the other cantonments within this province the number of cases varied from 761 at Ferozepore to 1,970 at Peshawur, 2,383 at Meean Meer, and 2,831 in the fort of Attock.

The statistics of previous epidemics of fever.

247. It has been stated that fevers were more prevalent throughout the Bengal Presidency in 1869 than in any year since 1863, but the bare statement of this fact without any detail of the areas which have been chiefly affected in these two years would admit of no satisfactory comparison being made. In the annexed statement the statistics of fevers in each year since 1858 have been entered, and it contains several points of much interest. It is to be remarked that, although under the head of fevers a certain proportion of cases of enteric and other specific fevers is included, the great mass of cases were intermittent, remittent, and continued, the various forms of malarious fevers usually accepted as belonging to that class.

Statement showing the relative prevalence of and Mortality from fevers per 1,000 *of average strength in each group of stations during the eleven years* 1859-69.

	1859.		1860.		1861.		1862.		1863.		1864.		1865.		1866.		1867.		1868.		1869.	
	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
1st Group...	608	5·39	773	5·82	588	4·61	462	3·25	591	3·17	422	5·0	618	7·40	663	3·37	341	...	571	4·37	301	3·15
2nd do.	800	8·52	860	5·42	431	2·27	441	3·35	475	1·40	313	3·96	445	4·94	308	3·98	259	1·57	241	2·02	361	5·18
3rd do.	804	6·61	692	5·70	510	6·04	580	2·76	462	2·60	453	2·53	308	3·13	241	1·64	324	3·58	322	3·27	423	3·43
4th do.	1,536	9·16	1,256	5·72	1,569	7·60	1,507	5·54	738	3·34	668	2·07	707	3·20	877	6·95	837	3·06	583	1·30	1,009	4·57
5th do.	645	3·68	443	3·23	744	2·20	972	3·01	1,075	3·45	720	1·89	580	2·67	517	1·97	577	2·87	615	3·34	1,110	5·28
TOTAL ...	792	6·58	723	4·85	715	3·97	805	3·34	739	2·82	542	3·14	528	3·71	468	3·23	465	2·63	462	2·88	750	4·71

A.—Admissions. D.—Deaths.

Statistics of fevers from 1859 to 1869.

248. This return bears out the statement that fevers have been more prevalent over the European army of Bengal during the past year than in any year since 1862. But in the first three groups the returns were comparatively favorable during 1869. The unusual prevalence of the disease was chiefly confined to the fourth and fifth groups: a reference to previous years also shows that the areas represented by these groups are those in which fever most frequently assumes an epidemic form. The two provinces, however, do not always suffer in common. In 1859, 1860 and 1861 for example, the Central Provinces showed a very high ratio of admissions from this cause, while the Punjab was comparatively free. In 1862 both suffered severely. In 1863 the Punjab was most affected. In 1869 the ratio of admissions in each has been very much the same.

The connection between the prevalence of fever and the meteorology of the year cannot be satisfactorily explained.

249. There can be little doubt that a close connexion exists between the unusual prevalence of fever in 1869 and the meteorology of the year, but its exact nature is not easily determined. No relation can be established between the extent of rainfall and the amount of fever at different stations. For example, at Umballa 12·4 inches fell in July and 8·3 in September, or a total of 20·7; but during the five months, July to November, the number of cases of fever was very small, and amounted only to 304 per 1,000. At Lahore, during the same period, the rainfall was 14·2, and fevers equalled 1,783 per 1,000. At Rawul Pindee the rainfall during the same period was 9 inches, and fevers numbered 1,410 per 1,000. At Peshawur, with a rainfall of only 9·5 inches in these months, the admissions from fevers were 1,206 per 1,000. Nor is the increase in fevers synchronous with the rain; this is particularly seen in the case of Peshawur. In the month of June only $\frac{7}{10}$ths of an inch fell, in July there was none, in August $\frac{9}{10}$ths, in October 1·6, and in November again none: yet the admissions rise from 221 in July to 429 in August, 425 in September, 514 in October, and 490 in November. The comparative statistics of rain and fever in a few stations during 1869 are given in the annexed statement:—

Stations.		Months.				
		July	August	September	October	November
Delhi	Rainfall	6·5	2·2	8·2	1·7	0
	Fevers	43	97	72	93	67
Umballa	Rainfall	12·4	0	8·3	0	0
	Fevers	64	90	84	81	87
Jullundur	Rainfall	11·4	1·7	7·06	0	0
	Fevers	62	91	126	209	258
Lahore	Rainfall	5·5	0·2	4·9	3·6	0
	Fevers	104	260	215	517	786
Rawul Pindee	Rainfall	4·91	.32	3·98	0·1	0
	Fevers	102	266	537	775	530
Mooltan	Rainfall	2·7	2·8	1·9	0	0
	Fevers	86	90	127	197	327
Ferozepore	Rainfall	17·2	·8	7·3	1·4	0
	Fevers	86	81	41	83	179
Peshawur	Rainfall	0	·9	7·0	1·6	0
	Fevers	221	429	425	514	490

Different years with similar rainfall, show very different prevalence of fever.

250. If the results of previous years be taken, it will appear that in some of them, with a rainfall quite as high as in the past year, there was no unusual prevalence of fever. At Rawul Pindee, for example in 1868, the rainfall during the five months, July to November, was 12·9, or one-fourth greater than

in 1869, and yet 1868 was a year strikingly non-epidemic in its character. Nor can any relation be traced between fever and difference in temperature in the autumn months. The statistics on this point have been carefully examined, but they lead to no results. These facts are of great importance as illustrating how very ignorant we still are of the circumstances under which malarial diseases assume an epidemic character, and how much remains to be done in elucidating the subject.

Apoplexy was more fatal than in any year since 1859.

251. Of apoplexy, 261 cases were treated in 1869 compared with 241 in 1868. The ratio of admissions in the two years was almost identical,—7·6 and 7·5 per 1,000. But the ratio of deaths from this cause in 1869 (3·78) was considerably higher than in the year previous (2·78), and much higher than in preceding years. Apoplexy has indeed been more fatal to European soldiers serving in the Bengal Presidency in 1869 than in any year since 1859, when it caused a loss of 4·10 per 1,000 of average strength. Lucknow, Allahabad and Morar contributed the greatest number of casualties from this cause: nearly one-half of those attacked died.

Dysentery and diarrhœa were more prevalent and fatal than in any year since 1863.

252. Dysentery and diarrhœa also were more than ordinarily prevalent and fatal. The admissions equalled 150 and the deaths 3·55 per 1,000. These results are more unfavorable than in any year since 1863, in which the admissions equalled 159 and the deaths 3·73 per 1,000. In 1868, when the returns were most favorable, they showed 114 cases and 1·71 deaths per 1,000. In the fourth group, bowel complaints were most prevalent and fatal. The deaths from apoplexy occurred chiefly at stations which suffered much from cholera, and the results may, in some degree, be ascribable to the exposure of camp; but no such explanation can be given of the unusual number of cases of dysentery and diarrhœa. The admissions and deaths due to these diseases were certainly high at Lucknow, Allahabad and Morar, where the troops moved into camp. When cholera prevails, an unusual number of cases of diarrhœa is to be expected, and the ratio of 296 per 1,000 of this nature at Allahabad exceeds that of any station when there was a considerable body of troops. But, if dysentery be taken alone, the proportion of cases treated at some other stations fell not far short of that returned from those places where the troops were under canvas at an unfavorable time of the year. The highest ratio of admissions from this disease in any station where the troops moved into camp on account of cholera was 102 per 1,000 at Allahabad, but at Meerut, without any exposure, the number was 97.

Delirium tremens was considerably more prevalent than in 1868.

253. Two hundred and twenty-three cases of delirium tremens were treated during the year, and of these 22 were fatal. The admission rate was 6·4 and the death rate ·64 per 1,000. Three of the deaths from this cause occurred in Fort William, and five at Meerut. The results of 1869 under this head are more unfavorable than those of 1868, when they showed 4·4 cases and ·38 deaths per 1,000.

Hepatitis was more fatal than in any year since 1858.

254. In 1858 the admissions from hepatitis equalled 67 and the deaths 5·84 per 1,000. In the admission rate there has been no great difference, the numbers having varied between a maximum of 67 in that year and a minimum of 51 in 1868. The deaths from this cause had, however, gradually diminished, and in 1867 were at their lowest,—a ratio of 2·57 per 1,000. The results of 1869 have, as regards this disease, been very unfavorable, more so than in any year since 1858. The highest death rate in any one group was 6·83 in Bengal Proper. Taking individual stations, no connection can be traced between this disease and any exposure in camp on account of cholera. The proportion of admissions at Lucknow, Allahabad and Morar was 50, 88, and 19 per 1,000. At Dinapore, where the troops did not move into tents, it was 109, at Bareilly 76, and at Moradabad 109. Great part of the sickness at Allahabad and other stations, which was ascribed to exposure in camp, seems to have been really due to the influence of a very unhealthy season.

Venereal diseases were as prevalent in 1869 as in 1868.

255. During 1869 the ratio of admissions from venereal affections has been 200 per 1,000. The difference between the proportion of admissions in 1869 and in 1868 is so very trifling, that practically they may be regarded as being the same in these two years; and it is much to be regretted that, when better results had been expected from a more careful enforcement of the rules for the prevention of venereal disease, there has been no improvement, and that the statistics of venereal disease in 1869 have been less favorable than they were in 1867. This result is all the more unsatisfactory, because the prevalence of these affections among the soldiers in 1869 was not confined to a few stations, the unfavorable returns from which have unduly raised the general average, but in the greater number of them, the records for the past year show an increase of such cases as compared with the number treated in the year previous.

Comparison of the stations in these two years.

256. Dr. Bryden's returns give the admissions per 1,000 in 58 different bodies of men. Among six of these no comparison can be made between the extent of venereal affections in 1869 as compared with any former year, as they formed working parties, or occupied stations for which no returns were previously given. They were as follows :—

		Admissions per 1,000.
1.—Chunar	...	.. 392·8
2.—Raneekhet roads	(7 months)	... 75·8
3.—Chuckrata	(8 months)	... 138·2
4.—Jutogh	(7 months)	... 24·7
5.—Dalhousie roads	(6 months)	... 157·1
6.—Murree roads	(7 months)	... 60·8

At 29 of the places where the returns for 1869 can be compared with those for 1868, there has been an increase of disease during the former year, and in some of these cases the increase has been large.

STATIONS.	RATIO OF ADMISSIONS FROM VENEREAL DISEASE PER 1,000 OF AVERAGE STRENGTH.		REMARKS.
	1868.	1869.	
1. Fort William	250·6	253·3	
2. Dinapore	319·7	342·5	
3. Benares	306·2	308·7	
4. Seetapore	94·0	210·5	For 9 months only in 1868.
5. Futtehgurh	159·5	401·0	
6 Cawnpore	260·4	439·4	
7. Bareilly	262·9	347·4	
8 Moradabad	207·7	294·9	For 10 months only in 1868.
9. Nynee Tal	290·8	331·7	For 8 months in each year.
10. Landour	53·4	160·4	For 7 months in each year.
11. Roorkee	93·8	169·4	
12. Meerut	131·2	143·6	
13. Muttra	96·5	111·9	
14. Agra	153·1	192·2	
15. Morar	184·9	223·7	
16 Gwalior	131 8	350·8	
17. Seepree	150 7	325 8	For only 10 months in 1868.
18. Jhansie	179·6	401·3	
19. Nowgong	270·3	441·2	
20. Jubbulpore	189·6	263·2	
21. Umballa	92·6	99·1	
22. Dugshaie	55·0	128·5	10 months in each year.
23. Subathoo	111·9	178·7	10 months in 1869, 9 months in 1868.
24. Jullundur	104·0	167·1	For 9 months in 1868.
25. Ferozepore	127·3	154·5	
26. Sealkote	112·9	118·4	
27. Govindgurh	169·2	188·0	
28. Fort Lahore	119·1	123·4	
29. Nowshera	74·1	92·2	

In some of these cases the increase is trifling, in others a perfectly fair comparison cannot be made, owing to the fact that the periods of observation in the two years do not correspond; but there is ample evidence to show that at nearly every one of these places the preventive measures have proved a failure. In not a few instances the failure has been signal, and the ratio of admissions from venereal affections at Futtehgurh, Cawnpore, Jhansie, and Nowgong exceed that of any station during 1868.

In 23 cases there has been a decrease of venereal affections, and the comparative ratios of 1868 and 1869 as regards them stand thus—

STATIONS.	RATIO OF ADMISSIONS FROM VENEREAL DISEASE PER 1,000 OF AVERAGE STRENGTH.		REMARKS.
	1868.	1869.	
1. Dum-Dum	374·8	138·0	
2. Barrackpore	315·2	235·4	
3. Berhampore	272 0	188·3	Only 8 months in 1869.
4. Darjeeling	76·2	58·8	
5. " Depôt	142·8	104·8	
6. Hazareebaugh	317·3	216·5	
7. Fyzabad	176·1	163·4	Only 10 months in 1869.
8. Lucknow	247·4	170·7	
9. Allahabad	396·7	345·9	
10. Shahjehanpore	251·7	142·8	Only 9 months in 1868.
11. Delhi	166·1	127·1	
12. Saugor	166·5	141·3	
13. Kussowlie	131·6	85·0	
14 Mooltan	192·5	108·9	
15 Dera Ismail Khan	131·3	50·5	
16. Dhurmsala	238·5	28·0	
17. Kangra	283 8	15·1	
18. Meean Meer	150·8	143·7	
19. Rawul Pindee	151 3	134·7	Only 11 months in 1868.
20. Campbellpore	140·1	85·6	Only 10 months in 1868.
21. Attock	234·6	156·6	
22. Murree	176·1	105 4	
23. Peshawur	201·1	89·4	

In one or two of these the returns are all the more favorable when compared with those of the year previous, as the statistics of 1869 include a whole year, while those of the same stations for 1868 embrace only a part of that year.

These statistics include both primary and secondary forms.

257. As these figures generally differ from those which are given by the Medical Officers in charge of the Lock Hospitals, it may be well to state that Dr. Bryden's statistics under the head of "venereal disease" embrace all forms, both primary and secondary, and in this respect are open to some exception as an accurate test of the results derived from the preventive measures for the year; but as the returns for all stations are prepared in the same way, it is not probable that any Lock Hospital is thereby made to occupy a lower position in the comparative scale than it would otherwise have done. In connection with this subject, there is another question which deserves some notice. In showing the amount of success which has attended their efforts to repress venereal disease, some Medical Officers have excluded all cases of gonorrhœa among the soldiers; but although this is a trivial ailment compared with any form of syphilis, it is one of the diseases for the prevention of which these measures were adopted, and their value cannot be properly tested if it is left out of the calculation.

Important modifications have recently been made in the rules for the prevention of venereal disease.

On a review of the working of the Lock Hospitals during 1868, several important alterations in the rules for the prevention of venereal disease were suggested—the extension of the area around each cantonment over which they should be in force, the classes of persons to be registered, and other points regarding which more complete measures appeared to be required. Attention was at the same time drawn to the necessity of a much more efficient administration of the rules already prescribed which in many cantonments had either never been enforced or had been allowed to fall into disuse. On all these matters orders have been issued by the Government; but as they appeared only in the commencement of the current year, the experience of 1869 is valuable only as showing that the rules as they formerly stood were insufficient for the end desired. The results of 1869 have certainly been most unsatisfactory; but it is to be hoped that, with the more strict supervision now introduced, the returns of 1870 may show decided progress.

Relation of age to mortality.

258. The statement of mortality according to age shows as usual an excessive death rate among old soldiers. As noted in last year's report fevers formed an exception to this rule, the mortality among men under 25 years of age from this cause having been heavier than among those of more mature age.

Distribution of the Strength of the Army according to Age at the beginning of 1869.*

Total Strength.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.
					11,445	
35,956	2,331	10,188	11,992	8,290	2,731	424

Deaths of 1869, *and the Death-rates per* 1,000 *of the Strength at the different Ages.*

CAUSES OF DEATH.	Deaths of 1869.				Died per 1,000 of the strength above stated.				Comparison in Percentages.				
	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20	20 to 24.	25 to 29	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Total.
Cholera	18	158	175	219	7·72	15·51	14·59	19·14	13·55	27·23	25·62	33·60	100
Fevers	11	75	39	41	4·72	7·36	3·25	3·58	24·96	38·92	17·19	18·93	100
Heat Apoplexy	4	21	39	69	1·71	2·06	3·25	6·03	13·10	15·79	24·90	46·21	100
Delirium Tremens		...	4	17	...	...	·34	1·49	...	...	18·58	81·42	100
Dysentery and Diarrhœa	1	38	36	47	·43	3·73	3·00	4·11	3·82	33·09	26·62	36·47	100
Hepatitis	1	29	46	95	·43	2·85	3·84	8·30	2·79	18·48	24·90	53·83	100
Phthisis pulmonalis	1	20	15	37	·43	1·96	1·25	3·23	6·26	28·53	18·19	47·02	100
Heart diseases	...	...	12	41	...	..	1·00	3·58	...		21·83	78·17	100
All other causes	3	32	55	88	1·29	3·14	4·59	7·69	7·72	18·79	27·47	46·02	100
All causes	39	373	421	654	16·73	36·61	35·11	57·15	11·49	25·15	24·11	39·25	100
All causes excluding Cholera	21	215	246	435	9·01	21·10	20·52	38·01	10·17	23·80	23·15	42·88	100

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* See note to Table XIV for European Troops.

Returns of married and unmarried soldiers.

259. The numbers of married and unmarried men in the different grades and arms of the service as they stood on the 1st of May, are shown in the following abstract, as well as the ratios in each case :—

Abstract of Married and Unmarried European Non-Commissioned Officers and Soldiers serving in the three Presidencies on the 1st of May 1869.

REGIMENTS.	STAFF SERGEANTS.				SERGEANTS.				RANK AND FILE.				TOTAL OF ALL GRADES.		
	Establishment in India.	Married.	Unmarried.	Percentage of married to actual strength.	Establishment in India.	Married.	Unmarried.	Percentage of married to actual strength.	Establishment in India.	Married.	Unmarried.	Percentage of married to actual strength.	Married.	Unmarried.	Percentage of married to actual strength.
Engineers.															
Bengal	2	3	1	75·	25	5	27	15·62	48	19	49	27·94	27	77	25·96
Madras	3	.	...	...	25	12	9	57·14	154	4	15	21·05	16	24	40·
Bombay	2	1	1	50·	4	1	...	100·	8	5	3	62·5	7	4	63·63
TOTAL ...	7	4	2	66·66	54	18	36	33·33	210	28	67	29·47	50	105	32·25
Artillery.															
Bengal	153	110	30	78·57	277	142	163	46·55	5,931	491	5,202	8·62	743	5,395	12·10
Madras	70	58	10	85·29	122	91	32	73·98	2,615	383	2,316	14·19	532	2,358	18·40
Bombay	62	50	11	81·96	108	63	44	58·87	2,338	220	2,126	9·37	333	2,181	13·24
TOTAL ...	285	218	51	81·04	507	296	239	55·32	10,884	1,094	9,644	10·18	1,608	9,934	13·93
Cavalry.															
Bengal	77	44	32	57·89	259	75	127	37·12	2,891	217	2,618	7·67	336	2,807	10·69
Madras	22	11	5	68·75	72	31	34	47·69	826	96	731	11·60	138	770	15·19
Bombay	28	15	3	83·33	70	28	24	53·84	828	39	685	5·38	82	712	10·32
TOTAL ...	127	70	40	63·63	301	134	185	42·00	3,543	352	4,034	7·9	556	4,289	11·47
Infantry.															
Bengal	297	166	85	66·13	1,353	543	669	44·80	26,763	1,966	23,135	7·83	2,675	23,889	10·07
Madras	81	47	25	65·27	369	123	201	37·96	7,299	578	6,023	8·75	748	6,249	10·69
Bombay	110	69	21	76·66	400	191	173	52·47	8,100	630	7,068	8·18	890	7,262	10·91
TOTAL ...	488	282	131	68·28	2,122	857	1,043	45·10	42,162	3,174	36,226	8·05	4,313	37,400	10·33
Grand Total of all Arms ...	907	574	224	71·92	2,984	1,305	1,503	46·47	56,799	4,648	50,001	8·50	6,527	51,729	11·20

Comparative sickness and mortality among married and unmarried soldiers.

260. The comparative sickness and mortality among married and unmarried soldiers in 1869, are shown in the following statement, in which the results for the past year are also compared with those of 1867 and 1868 :—

Summary of Return for married and unmarried Soldiers in 1869, *showing also the parallel Statements for* 1868 *and* 1867.

[An approximate Statement differing in many details from the General Tables of the years.]

	Year.	Average Strength.	Total number of days spent in Hospital during the year.	Average number of days spent in Hospital by each man.	Admission rate of the year per cent. of strength.	DETAILS OF STRENGTH ACCORDING TO AGE. Under 20	20 to 24	25 to 29	30 to 34	35 to 39	40 and upwards.	DETAILS OF DEATHS ACCORDING TO AGE. Under 20	20 to 24	25 to 29	30 to 34	35 to 39	40 and upwards.	Total Admissions and Deaths during the year.		CAUSES OF ADMISSIONS AND DEATHS. Cholera.	Fevers.	Heat Apoplexy.	Drunkenness.	Delirium Tremens.	Dysentery and Diarrhœa.	Hepatitis.	Venereal affections.	Heart Disease.	Phthisis Pulmonalis.	Disease of Lungs.	Ophthalmia.	Scurvy.	Accidents and Injuries.	Suicide.	All other Causes.
Total for married men ...	1869	3,450	32,596	9½	89	...	115	1,002	1,470	732	131	...	3	26	75	5	11	Admitted	3,078	57	1,337	38	22	46	255	114	6	33	29	112	144	.	181	..	704
																		Died	166	49	15	21	1	5	12	19	...	9	9	6	...	...	1	4	13
	1868	3,351	26,825	8	78	..	148	967	1,418	662	136	...	1	15	40	20		Admitted	2,613	15	523	40	106	30	202	145	15	16	17	77	155	..	151	1	787
																		Died	88	9	3	21	1	8	8	10	...	6	7	2	...	...	1	1	11
	1867	3,012	27,146	9	88	1	128	835	1,331	582	135	...	1	31	40	26	12	Admitted	2,642	64	504	19	53	19	291	97	12	32	28	107	182	4	170	1	729
																		Died	110	52	6	9	1	4	6	3	...	3	8	2	...	...	2	2	11
Total for unmarried men	1869	30,728	675,810	22	178	2,188	8,915	9,757	6,992	2,514	332	38	370	405	331	122	35	Admitted	54,694	780	23,784	203	212	152	4,697	1,650	6,341	410	339	1,415	614	25	2,928	13	11,195
																		Died	1,301	484	169	94	...	10	113	125	4	42	62	28	...	...	23	16	131
	1868	30,336	581,707	18½	139	1,762	9,176	10,813	6,241	1,949	365	27	140	158	147	56	10	Admitted	42,158	57	13,890	221	635	107	3,443	1,465	6,064	321	223	1,395	625	23	3,021	4	10,718
																		Died	568	41	99	70	6	3	57	87	4	29	41	24	..	3	17	14	73
	1867	30,562	567,739	18⅔	136	1,293	6,998	11,817	6,310	2,131	315	25	212	327	215	78	8	Admitted	42,634	551	13,670	122	572	104	3,952	1,702	5,227	351	204	1,307	736	24	2,952	11	11,149
																		Died	868	370	77	47	8	10	52	76	2	30	36	29	...	1	21	10	69

Dr. Bryden's memo. on these statistics.

261. On these statistics Dr. Bryden has prepared the following memorandum:—

Returns showing in contrast the sickness and mortality among the married and unmarried soldiers of European regiments have been received since 1867. The results for the three years 1867, 1868 and 1869 are exhibited in the following statements. The figures which appear here are the sum of returns furnished directly by regiments; and although these differ in many details from what is shown in the more correct general tables for the year, the totals approximate with sufficient accuracy and can be appropriately used for the purpose for which they have been brought together.

In the memorandum on this subject furnished in the two previous years, the necessity was pointed out of reading the results shown in the returns for married and unmarried men in connexion with those shown in the Age Table for the year, since the ratios are to a great extent representative only of the fact that a certain proportion of the married men are of an age which contrasts with that of the unmarried men taken as a body.

In 1867, 68 per cent. of the total of married men exceeded 30, and 32 per cent. were under 30 years of age; of the unmarried 28 per cent. exceeded 30, and 72 per cent. were below this age.

In 1868, 66 per cent. of the total of married men are returned as over 30, and 34 per cent. as under 30; of the total of unmarried, 28 per cent. exceeded 30, and 72 per cent. were under 30 years of age.

In 1869, 68 per cent. of the total of married men exceeded 30, and 32 per cent. were under 30 years of age; of the total of unmarried 32 per cent. exceeded 30, and 68 per cent. were under 30 years of age.

In the Age Tables for the three years, it is shown that the death-rate (exclusive of cholera) was as follows:—

In 1867, 25,790 men below 30 gave 318 deaths=12·33 per 1,000.
In 1868, 23,487 men below 30 gave 332 deaths=14·14 per 1,000.
In 1869, 24,511 men below 30 gave 482 deaths=19·66 per 1,000.
In 1867, 10,857 men above 30 gave 285 deaths=26·25 per 1,000.
In 1868, 10,122 men above 30 gave 246 deaths=24·30 per 1,000.
In 1869, 11,415 men above 30 gave 435 deaths=38·01 per 1,000.

In the results for these years the great excess of the death-rate of men above 30 is apparent; and the married men being the older class may be expected to have an excess of mortality proportionate to their age taken as a class.

In 1867, 3,012 married men gave 110 deaths=19·26 per 1,000, exclusive of cholera deaths.
In 1868, 3,351 married men gave 79 deaths=23·58 per 1,000, exclusive of cholera deaths.
In 1869, 3,450 married men gave 117 deaths=33·90 per 1,000, exclusive of cholera deaths.
In 1867, 30,862 unmarried men gave 498 deaths=16·10 per 1,000, exclusive of cholera deaths.
In 1868, 30,336 unmarried men gave 527 deaths=17·37 per 1,000, exclusive of cholera deaths.
In 1869, 30,728 unmarried men gave 817 deaths=26·60 per 1,000, exclusive of cholera deaths.

The components of the death-rates of the two classes are contrasted in the following statement. As in 1867 and 1868, the excess of the death-rate of 1869 in the case of the married is seen to be due to the diseases peculiar to the old soldier—heat apoplexy, delirium tremens, and heart disease. The excess of the fever rate in the case of the young unmarried soldier is due in a great measure to deaths caused during the acclimatising process; and his greater liability to fever is made more apparent in the table contrasting the admission-rates of the two classes, where it is shown that while 38·75 per cent. of married men were admitted for fevers, the unmarried show a ratio of 77·40 per cent.

Death-rates of 1867, 1868 *and* 1869 *in the two classes contrasted.*

Causes of deaths.	Married.			Unmarried.		
	1869.	1868.	1867.	1869.	1868.	1867.
Cholera	14·20	2·68	17·26	15·75	1·35	11·99
Fevers	4·35	·88	1·99	5·50	3·26	2·50
Heat apoplexy	6·09	6·27	2·99	3·06	2·31	1·52
Drunkenness	2·60	·30	·33	..	·20	·26
Delirium tremens		2·39	1·33	·33	·10	·32
Dysentery	3·48	2·39	1·99	3·68	1·88	2·66
Hepatitis	5·51	2·99	1·00	4·07	2·87	2·46
Heart disease	2·60	1·79	1·00	1·37	·96	·96
Phthisis pulmonalis	2·60	2·09	2·66	2·02	1·35	1·17
Lung diseases	1·45	·60	1·00	·91	·79	·94
Accident	·29	·30	·66	·75	·56	·68
Suicide	1·16	·30	·66	·52	·46	·32
All other causes	3·77	3·28	3·65	4·39	2·63	2·34
Died per 1,000	48·10	26·26	36·52	42·35	18·72	28·09
Exclusive of cholera	33·90	23·58	19·26	26·60	17·37	16·10

In 1867, 29·09 per cent. of all deaths of married men occurred in men below 30, and 70·91 per cent. in men above 30.

In 1868, of the total deaths of married men, 21·59 per cent. were in men below 30, and 78·41 per cent. in men above 30.

In 1869, of the total deaths of married men, 17·47 per cent. were in men below 30 and 82·53 per cent. in men above 30.

In 1867, 35·02 per cent. of all deaths of unmarried men occurred in men above 30, and 64·98 per cent. in men below 30.

In 1868, of the total deaths of unmarried men, 62·50 per cent. were in men below 30, and 37·50 per cent. in men above 30.

In 1869, of the total deaths of unmarried men, 62·49 per cent. were in men below 30, and 37·51 per cent. in men above 30.

Death-rate at the same ages in the two classes contrasted.

(INCLUSIVE OF CHOLERA DEATHS).

AGES.	MARRIED.			UNMARRIED.		
	Strength.	Deaths.	Ratio per 1,000.	Strength	Deaths.	Ratio per 1,000
Under 20	......	......	25·96	2,188	38	38·92
20 to 24	115	3		8,915	370	
25 to 29	1,002	26		9,787	405	
30 to 34	1,470	75	51·02	6,992	331	47·34
35 to 39 . ..	782	51	71·84	2,514	122	55·16
40 and upwards	131	11		332	35	

In the returns for 1867 and 1868, the young married men did not give a death-rate contrasting favourably against that for the unmarried men of the same age, such as appears in the above statement for 1869. Could the cholera deaths of the two classes at this age have been deducted from the total mortality, in all probability the death-rates would not have differed to any great extent; but the returns furnished do not contrast special diseases in relation to the ages. In 1868, a year very favourable for comparison, the death-rates for men below 30 showed scarcely any difference; the married class gave a death-rate of 16·74 per 1,000, while that of the unmarried class was 16·30.

The gradual rise of the ratio with age is shown in both classes, but in the case of the old married man the ratio is very disproportionate, and this I attribute to the deteriorated value of the life of the old married Indian soldier, who is in very many cases tied to the country by the fact of his being married.

Admission rates of the two Classes contrasted.

CAUSES OF ADMISSIONS.	MARRIED.			UNMARRIED.		
	1869.	1868.	1867.	1869	1868.	1867.
Cholera	1·65	·45	2·12	2·54	·19	1·79
Fevers	38·75	24·56	26·69	77·10	45·59	44·29
Heat apoplexy	1·10	1·19	·63	·66	·73	·40
Drunkenness	·64*	3·17	2·75	·69*	2·10	1·85
Delirium tremens	1·33	·89	·63	·59	·35	·34
Dysentery and Diarrhœa	7·39	6·03	9·66	15·29	11·35	12·80
Hepatitis	3·30	4·33	3·22	5·37	4·83	5·52
Venereal diseases	·18	·45	·40	20·64	19·99	16·94
Heart disease	·96	·48	1·06	1·33	1.06	1·14
Phthisis pulmonalis ...	·84	·51	·93	1·10	·73	·66
Diseases of lungs	3·25	2·30	3·55	4·62	4·60	4·23
Ophthalmia	4·17	4·71	6·04	2·00	2·07	2·38
Accidents	5·25	5·43	5·64	9·20	9·97	9·56
All other causes	20·41	23·48	24·36	36·56	35·11	36·25
Admitted per cent. of strength ...	89·22	77·98	87·68	177·99	138·97	138·13

The predominance of fever among the younger men is shown by a ratio which is double in the case of the unmarried; to climatic influences affecting the more susceptible body may be ascribed also the exaggeration of the ratio for bowel complaints among the unmarried. The ratio for hepatitis indicates clearly that this disease is not special to the old man; it prevails at any age subsequent to the completion of the primary process of adaptation.

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* Drunkenness is not now recognised among the causes of admissions into hospital; the effects are supposed to be manifested in some special disease, which is entered in the returns in place of Ebriositas.

The disparity of the admission rates caused by the item of venereal affections amounts in 1869 to 20·46; the ratio for the married is ·18 per cent, and for the unmarried 20·64, the equivalent, in the first instance, of 6 admissions and in the latter of 6,341.

As usual, the ratio for eye diseases is more than double in the case of the married, due, probably, to infection acquired during the time that the families are suffering from ophthalmia; for 1869, in the married the ratio is 4·17 per cent., and among the unmarried 2·00 per cent.

The daily sick rate of the unmarried is more than double that of the married men, due, no doubt, in great measure, to the excess of venereal disease:—

In 1867, 3,012 married men spent 27,146 days in hospital, or 9 days per man.
In 1867, 30,862 unmarried men spent 567, 739 days in hospital, or 18·39 days per man.
In 1868, 3,351 married men spent 26,825 days in hospital, or 8 days per man.
In 1868, 30,336 unmarried men spent 561,707 days in hospital, or 18½ days per man.
In 1869, 3,450 married men spent 32,596 days in hospital, or 9½ days per man.
In 1869, 30,728 unmarried men spent 675,810 days in hospital, or 22 days per man.

The loss from invaliding was heavier than in any previous year.

262. It has been already shewn that the death rate of 1869 was exceptionally high, and the loss from invaliding has also been more than usually heavy. Eighteen hundred men were invalided during the year, 503 for discharge from the service, and 1,797 for change of air; the proportion under both heads amounting to 53·98 per 1,000. This return shews a more unfavorable result than in any year of which there is any record. Between 1858 and 1868, the ratio fluctuated from 24·80 in the first of these years and 49·04 in 1866. The total loss to the army from death and invaliding together in 1869 amounted to 96·87, the highest ratio in any one year since 1857, excepting 1858, when it aggregated 154·66.

This result has been due chiefly to the large number of men sent home for change of air.

263. But this result is not in reality so unfavorable as it at first sight appears. The actual loss of men by discharge was only 15·08, and although this is higher than in 1868, it is not so high as in either 1865, 1866 or 1867, when it varied from 16·16 to 17·1. The high invaliding ratio of the year has been due chiefly to the large number of men sent to England for change. The proportion under this head equalled 38·89 per 1,000 compared with 32·26, the highest ratio in any former year. As railways extended and the facilities of transport *viâ* the Red Sea increased, it was to be anticipated that the number of men sent for change would increase also. The higher ratio of invaliding is not therefore altogether a matter of regret, as under present arrangements, many now enjoy the advantages of change of climate who would otherwise in a great many instances have remained to swell the death rolls. It would be of advantage to know how many men out of those sent to England from each Presidency, are ultimately discharged the service at Netley. On this point, a reference was made through the Inspector General of Hospitals to the Director General of the Army Medical Department, but it has been found impossible to make the separation between the different Presidencies, and the numbers are therefore given in the Blue Book as they concern India generally.

Comparison of stations.

264. An examination of Table VIII will shew the comparative healthiness of the different stations occupied by British Troops in this Presidency during 1869, whether tested by the ratio of cases admitted, the daily proportion ineffective from sickness, or the death rate. Judged by the first of these standards, the Attock garrison was most unhealthy, having had 3,741 cases per 1,000 of strength. Then follow Meean Meer with 3,392, Lahore Fort with 3,074, Peshawur with 2,998, Allahabad with 2,580, and Rawul Pindee with 2,472. It is very remarkable that stations which are usually the most healthy, shew a very great prevalence of sickness in 1869. Omitting hill stations and depôts, the daily sick rate varies from 34 at Campbellpore to 87 at Allahabad, and 89 in the small garrison of Chunar. As regards mortality, the most favorable ratio, 7·81, is shewn at Ferozepore and the most unfavourable, 158·13, at Allahabad.

Comparison of Regiments.

265. The statistics of individual regiments are fully detailed in Table XVI. They have already been in some measure referred to in discussing the general results of the year in

each group of stations. Tested by the number of admissions in the year, the most healthy body of men were the 5th Lancers at Lucknow, among whom they equalled 647 per 1,000; next comes the 37th Regiment at Shajehanpore with a ratio of 706. The most unhealthy was the E. Battery XIX Brigade R. A. at Rawulpindee, where the admissions amounted to 4,266 per 1,000. The smallest mortality (7·04) occurred in the B. Battery XVI Brigade at Meerut. The highest mortality (185·49) was in the C. Battery VIII Brigade at Morar; but in the 58th Regiment at Allahabad the ratio (184·57) was not much lower, and in the 36th Regiment at Peshawur it equalled 171·70. Taking both deaths and invaliding together, the loss was heavier in the 58th Regiment than among any other body of men, the total from these two causes having amounted to no less than 316·19 per 1,000.

Sickness and mortality among women.

266. Seven tables have been given in illustration of the sickness and mortality among women and children. Out of a strength of 3,602 women there were 195 deaths, or a ratio of 54·14 per 1,000. In 1867, the most unfavourable year of which there is any detailed statement, the death rate was 46·21. Out of the 54·14, the portion due to cholera was 16·38. Dysentery, phthisis, heat apoplexy and child-birth follow as the chief causes of mortality. The death rate for individual stations and the diseases which chiefly contributed to the results in each are detailed in Table XIX.

Sickness and mortality among children.

267. Among children also there has been a very lamentable loss of life during the past year, the death rate having been 145·22. In 1868, it was 86·70, which, though a high ratio, is little more than half of the rate for 1869. Only a small portion of this loss (18·99) has been due to cholera; diarrhœa was most fatal, and the ailments returned under the heads of dentition and convulsions supplied a large number of casualties. Of the total of 826 children who died, it is worthy of notice that nearly 500 of the deaths occurred in the four months—May, June, August and September.

Information regarding ages of children will be given in the Tables for 1870.

268. In accordance with the instructions of the Right Honorable the Secretary of State, arrangements have been made for still further improving the statistics of children by adding details of their ages. The orders of the Government on this subject arrived too late to admit of their being applied to the returns of 1869, several of the Regiments having already left India. But in the tabular statements for 1870 the additional information will be given.

Measures have been adopted to test the new standard plan of barracks.

269. With the occupation of the new barracks, built on the standard plan for European troops, several very important questions have arisen. Complaints have been received from several stations, but more particularly from Jullundur and Allahabad, that the new buildings are unsuited to the climate and ill adapted to secure the comfort of the men. In consequence partly of these representations and partly also on financial grounds, comparatively little progress has been made in building new barracks during 1869. In the meantime means have been adopted to ascertain the temperature in the different kinds of buildings inhabited by European troops, and registers have also been brought into use which will supply valuable data as to the effect of double stories in preserving the health of the men, and more especially in conferring immunity from cholera and fevers.

Alterations in plans already adopted.

270. The questions whether any material alteration is advisable in the standard plan, or whether one style of building should be adopted as suitable to the very varying conditions found in different parts of the country, will be more satisfactorily dealt with when the data above-mentioned have been collected. The scale of hospital accommodation to be provided for women and children has been revised. The number of beds formerly provided was unnecessarily liberal, and it has accordingly been reduced by one-third. Alterations have also been effected in the plan of married quarters to be built at hill stations, so as better to adapt

them to the climate, and it has been determined to allot the amount of space according to the number of each family. After a trial it has been resolved to abolish night privies in the standard plan of barracks.

Great success of employment of soldiers on road making from 1863 to 1869.

271. The employment of working parties in making roads in the hills during the hot season and rains, has again been attended with great success during 1869. Without entering into the details of these parties, I shall here quote a very important paper on the results of such operations between the year 1863 and 1869, which was submitted to the Government by Dr. Bryden during my absence :—

"With reference to your dockets No. 82 of 5th November 1869, and No. 789 of 17th ultimo, forwarding, for the information of the Sanitary Commissioner, reports regarding the working parties on the Raneekhet and Chumba Hills during the hot season of 1869, I have the honor now to forward a statement which shows the great success which has followed the experiment begun in 1863 and continued annually up to the present time. This table gives the aggregate strength of all the different parties employed during the past seven years, and the ratios of sickness and mortality are shown in relation to this strength.

During the period a strength of 4,610 men has been detailed for this service. From 1863 to 1869, a force has been employed annually in the Murree Hills, but in 1868, the men were withdrawn in August to join the Hazara Field Force; in 1868 and 1869, parties were sent to the Chumba Hills from Sealkote, Meean Meer and Jullundur; and in 1869, men drawn chiefly from the sickly wing of the 2-25th Regiment, which had suffered from fever at Berhampore, worked upon the Raneekhet Roads. Several of the parties have commenced work as early as April, but generally the men have reached their destination in the first week of May; and all these parties have rejoined their regiments in the last week of October and first week of November. Taking the broken periods of the months April and October, the strength for six months may be accurately fixed at 4,610. In assuming this to represent a strength of 2,320 for a year, it is necessary to keep in mind that the resulting ratios represent the occurrences of the six unhealthy months of the year, during which alone, in Upper India, the climatic and epidemic influences prejudicial to the European prevail. The contents of the table must be received in contrast to the ratios for the army as a body for the months from May to October. In other words, we must keep in mind what the same body of men would have suffered had it been kept in the plains, in place of being sent to the hills for these months.

I shall notice very briefly the leading points of this most important table. First, it shows that the number daily in hospital has not in any month exceeded 3¼ per cent. of the strength, and that on the average of the six months, the number under treatment has been under 3 per cent. Next, it shows that in these seven years, 19 men only have died while employed with these parties, a mortality which gives a ratio of 8·18 per 1,000 per annum. But when the details of these deaths are looked to, it is seen that 9 out of the 19 were accidental deaths; eight men were killed, or died from injuries, and one was suffocated while drunk.

The ratio from disease, excluding these accidental deaths, was 4·30 per 1,000 per annum. Of the 10 casualties from disease, the six below noted would, in all probability, have occurred under any conditions afforded to the individuals.

Rupture of hydatid cyst of the liver.
Kidney disease (nephria).
Aortic aneurism.
Heart disease (the man died suddenly after a wrestling match).
Pericarditis.
Phthisis pulmonalis (the patient died suddenly from laryngeal complication).

Of the four remaining deaths, one was caused by dysentery, probably a sequel of Peshawur fever, and three by fevers. The two fatal cases of remittent fever occurred in the Raneekhet party. The only fatal case in the Punjab parties was in a man who had suffered from Peshawur fever, in whom the sudden collapse which is sometimes seen in the course of this fever, took place. Not a single death attributed to cholera, heat apoplexy, diarrhœa, hepatitis or acute disease of the chest, is recorded in the table; an extraordinary testimony to the salubrity of the Indian climate when the various influences of the unhealthy season are mitigated or annulled. The effects of healthy employment are also conspicuous in the fact that but three cases of delirium tremens have been brought to notice during these seven years, and these were probably of a mild character, as no fatal event followed.

In taking account of the admissions of the period, the well known fact, that the transfer of men who have suffered from diseases due to the effects of climate to the most healthy localities, is not, even in the most healthy years, attended with the immediate restoration of the balance necessary to prevent the re-appearance of the form of climatic disease from which the patient has suffered, must not be lost sight of. This fact I have elsewhere illustrated in relation to the hill stations of this presidency,* and I call attention to it now that the inference may not be drawn that the working parties have suffered in the ratios exhibited as a consequence of the climate of the hills or of exposure. Many of the parties have been removed from sickly stations and from sickly regiments.

The ratio of deaths to admissions shows how slight have been the majority of these attacks, and how well the patients have been situated for recovery. It may be assumed that the diseases were in most cases secondary, and were not primary affections; and the inference is confirmed by the ratios of daily sickness already quoted. There has not been, during the period, a single admission from cholera or heat apoplexy. Of the 133 admissions from fevers classed as remittent or continued, it is right to note that 53 were furnished by the sickly Raneekhet party. The strength of this party being deducted, the ratio for these fevers becomes 3·64 per cent., and the average for the army as a body will be found to be four times as great.

In conclusion, I would beg the earnest attention of Government to the truth which is taught by this table. After having done our best to ameliorate the condition of the soldier, and to mitigate the effects of the influences to which our stations of the plains must always remain subject, success must be but partial, and at the best the experience of the plain stations can never yield results such as are here shown; as an experiment, the highest success has attended the employment of the British soldier in such work at a sufficient elevation; and as occasion offers, the opportunity of thus utilising the energies of the soldier should not be lost.

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* Report quoted by Mr. Strachey in his paper on hill stations—Sanitary Commissioner's No. 485 of 7th July 1864, page 4.

Statement showing the Sickness and Mortality among the Road-making Parties detached from Stations in the Plains to be employed in the Hills during the Hot Season. *Seven years* 1863—69.

MONTHS.	Average strength.	Average number daily sick.	Number daily sick per cent. of strength.	Number of deaths.	Died per 1,000 of strength.*	CAUSES OF DEATHS. Cholera.	Smallpox.	Fevers, intermittent.	Fevers, remittent and continued.	Heat Apoplexy.	Delirium tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Respiratory disease.	Heart diseases.	Phthisis pulmonalis.	Wounds and accidents.	All other causes.
January	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
February	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
March	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
April	901	14	1·55	3	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...
May	4,974	97	1·99	3	...	...	...	...	1	...	...	...	...	...	...	...	...	2	...
June	4,895	146	2·98	4	...	...	...	...	...	...	...	...	...	...	...	2	...	2	...
July	4,937	164	3·32	4	...	...	...	...	1	...	...	1	...	...	...	...	1	1	...
August	4,287	136	3·19	3	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2
September	4,259	141	3·31	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
October	3,701	*122	3·30	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
						...	...	1	2	...	...	1	...	...	..	3	1	9	2
						Died per 1,000 of the average strength.													
For the year ...	2320†	68	2·93	19	8·18‡	...	..	1·29		...	...	·43	...	...	..	1·29	·43	3·88	·86

* As for the whole year. † For six months 4,640, making up the deficiency of October by the strength of April. ‡ Deducting the deaths from injuries, the ratio for deaths from disease is 4·30.

CAUSES OF ADMISSIONS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total admitted during the six months.	Admitted per cent. of strength.*	Died per cent. of Admissions.
	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.														
Cholera	...	...	...	...	...	...	...	...	...	...	...	...	None.		
Smallpox	...	...	...	...	...	...	...	...	...	...	...	...	None.		
Fever, Intermittent	...	...	...	8	102	149	161	137	107	66	...	...	730 †	37·20	·35
„ Remittent and Continued	...	...	...	4	20	25	36	23	19	6	...	...	133		
Heat Apoplexy	...	...	...	...	...	...	...	...	...	...	...	...	None.		
Delirium Tremens	...	...	...	...	...	...	1	1	1	...	...	...	3	·13	·00
Dysentery	...	...	...	3	19	17	14	11	8	7	...	...	79	3·40	1·27
Diarrhœa	...	...	...	7	27	28	28	17	19	12	...	...	138	5·95	·00
Hepatitis	...	...	...	...	9	22	15	20	12	6	...	...	84	3·62	·00
Spleen disease	...	...	...	...	2	1	3	1	2	1	...	...	10	·43	·00
Respiratory diseases	...	...	...	5	23	30	21	26	9	12	...	...	126	5·43	·00
Phthisis Pulmonalis	...	...	...	...	...	...	1	1	1	..	...	...	3	·13	33·33
Rheumatism	...	...	...	...	17	31	40	29	13	18	...	...	148	6·38	·58
Venereal diseases	...	...	...	11	72	59	52	37	44	26	...	...	301	12·98	
Eye diseases	...	...	...	2	6	8	6	7	16	10	...	...	55	2·37	
Abscess and Ulcer	...	...	...	5	21	29	22	21	15	13	...	...	126	5·43	
Wounds and accidents	...	...	...	4	44	72	54	35	45	39	...	...	293	12·63	
All other causes	...	...	...	6	23	44	38	60	40	17	...	...	228	9·83	
	..	...	...	55	385	515	492	426	351	233	...	...	2,457		
	Admitted per cent. of the average strength in each month.														
	...	...	...	6·10	7·90	10·52	9·97	9·98	8·24	6·29	...	...	105·91 *		

† [illegible] from remittent and continued fevers in the 2-25th party on the Raneekhet Road.

Soldiers' gardens and work shops.

272. The general results of the soldiers' gardens for the year ending 31st March 1869 are considered very satisfactory. They shew a balance in hand of Rs. 3,672-8-9 against 2,242-14 in the previous year. By one regiment alone, upwards of 28,000tbs of vegetables were sold to the Commissariat. The number of men of each regiment employed in gardening varies much. Testimony is borne by nearly every medical officer to the beneficial effect of such a healthy recreation. The frequent changes consequent on the annual relief doubtless operate against the prosperity of the gardens, and the want of water in many stations is a serious difficulty.

Analysis of water in Military Cantonments, 5th Report.

273. Considerable progress has been made in the analysis of water since last year, and two additional reports, the fifth and sixth of the series, have been issued, shewing the results. In the first of these by Dr. Macnamara, particulars of the analyses conducted at seventeen stations are given, and several of the reports of the analysts who were engaged in the work have been added in an appendix. Among these, Mr. May's report on the water-supply of Dinapore is particularly interesting. In submitting this fifth report, Dr. Macnamara takes the opportunity of shewing in a tabular form what work had been accomplished since the scheme for analyzing water had been first put in operation. The results he thus summarizes:—"Of the fifty stations reported on, the water-supply, taken as a whole, may be said to be bad or deficient at Peshawur, Attock, Umballa, Delhi, Agra, Nuseerabad, Dinapore, Berhampore, Fort William, Alipore, Dum-Dum, and Barrackpore. Good water can be obtained at Peshawur, Agra, and Dinapore from certain wells, and the multiplication of properly constructed wells in fitting localities will render the supply at those stations abundant and wholesome. At Delhi, Attock, Berhampore, Fort William, and Barrackpore, a good supply of water may be afforded by making use for the purpose of the water of the neighbouring rivers. At Umballa and Nuseerabad, the supply may be rendered abundant and good by the construction of impounding reservoirs in the Morni hills at Umballa, and the Aravelli hills at Nuseerabad. At Dum-Dum the water must be purified, as I believe it can be, by thorough filtration; and at Alipore, where native troops only are stationed, the construction of wells near the present drinking water tanks will afford the means of providing wholesome water for their consumption."

Sixth Report on water analyses.

274. The sixth report which is submitted by Dr. W. J. Palmer, the Officiating Chemical Examiner, includes the details of the examination of the waters at eighteen stations, together with the remarks of the analysts. Plans have been introduced in which the sources of water-supply have been numbered, and particular wells can thus be identified, which could not always be satisfactorily done when their position was merely described. Mr. May has given a very full account of the water-supply of Simla. Able reports are also appended regarding the water of Meean Meer, Bareilly, Shajehanpore and and other stations by Dr. Center and Dr. Whitwell.

Remarks by the Army Sanitary Commission on water supply in India.

275. The Army Sanitary Commission in reviewing the results shewn in the first three reports of potable waters, have prepared a memorandum on the subject, copy of which has been forwarded by the Secretary of State. Their general conclusions regarding the practical measures to be adopted for improving the water-supply, are of much importance.

> "It will be seen" they remark "that this as yet partial examination of Indian waters has opened up an entirely new chapter of the disease causes in India. Suspicion which formerly prevailed as to the efficient operation of this cause of ill-health among troops and civil population, has become so strongly confirmed that the only question is what should be done—
>
> *First.*—In the first place, it is evident that these chemical examinations should be continued all over India, and that especial attention should be devoted to waters used in localities where cholera, dysentery and fevers are endemic. And in estimating the source of the saline constituents in water, it might be well to analyze samples of soils and sub-soils at different

depths and in different localities, with a view of ascertaining whether these salts are due to the geological conditions, or to old or recent impregnation of the soil with sewage impurities.

Secondly.—There are the practical questions of water sources and means of distillation. In regard to these points, there is nothing indicated in these reports which has not occurred elsewhere. Like evils require like remedies. In former days, London, as well as other cities and towns at home, suffered from precisely similar water impurities, arising from similar causes. London was formerly drained into cesspits, and derived its water-supply from the impure river at London Bridge, and partly from wells among the cesspits. We have no chemical account of these waters, but we can form a very good idea of their nature by analyzing the existing wells even after the metropolis has been drained. This has been done, and not a single well is fit for drinking purposes. During epidemic seasons, many are poisonous, like the wells in Oude. London was formerly scourged with fevers and dysenteries, just as India is, and yielded an enormous death-rate. The practical solution of the water question for India is the same as it was for London. All old wells among groups of population in cities, villages, bazars, and the like, which afford such waters as the wells submitted to analysis have done, should be rendered impervious to any infiltration of surface water by careful puddling or other methods. It has been stated, for instance, that an impure well at Bangalore was purified from foul surface drainage water by so simple and inexpensive an expedient as digging and removing the soil round the well's mouth to a distance of six feet from the tube, and about the same depth from the surface, and filling the space with clean sand. After cutting off the surface drainage, the true deep sub-soil water should be tested, and, if good, may be used, but if bad, then the well should be filled up and closed with as little delay as possible. Whenever these waters show readily oxydizable organic matter, requiring an amount of oxygen exceeding ·0,000,050 of a grain per 1,000 grains of water, together with a grain or two of common salt per gallon, or wherever there is ammonia present, or nitrites in any quantity, or organic matter, nitrates, and common salt, it may be considered certain that the water is unsafe during epidemic periods, and that its constitution cannot be depended on.

Thirdly.—The best available sources of water in India, as shown by these examinations, are rivers, streams, and lakes, and in some places impounding reservoirs might be advantageously constructed. Properly constructed tanks, which are a species of impounding reservoir, would answer in localities where the requisite facilities existed for their construction, provided due care were exercised in protecting the water from pollution, and in sand—filtering it before use. The roof water of buildings, filtered and stored under cover in places where it would not become impure by soakage of foul surface or sub-soil drainage, would form, in many cases, an important source of supply for drinking and cooking purposes at military stations. Wherever new wells must be depended on, they should be sunk in the cleanest ground available, and at a distance from dwellings and from all sources of impurity. The top should be built up and covered, and care should be taken to cut or puddle off the immediate sub-soil water from the well.

Fourthly.—It would be very desirable to improve the means of raising, conducting, and distributing water, so far as it might be practicable to do so, at stations where the present methods of distribution are found to add to the impurity of the water-supply.

In conclusion, we would beg to suggest that the whole subject of these water sources may at once be taken up in India, with the view of devising some practical method for providing troops and civil population with pure water."

A full report has been submitted to the Government on the evils existing in the water-supply at different stations, and the remedies which should in each case be adopted.

Entoozon in Ration Beef.

276. During 1869 out of 13,818 head of cattle killed for rations in the stations of the Upper Punjab, 768 were found to be infected with cysts, or a ratio of 5·55 per cent. In 1868 the proportion had been 6·12. It is to be observed that the condemnations were made chiefly in the earlier months of the year, and that since the modifications in the orders on the subject which were alluded to in last annual report, the number of carcases rejected has very much diminished. The recent statements received from the Commissary General shew only five or six in each month, and these have occurred chiefly at Rawul Pindee.

Mattresses and pillows for iron trestle cots.

277. For stuffing mattresses and pillows it has been decided that *coir* shall be supplied to all stations in Bengal Proper, and straw for all those in other parts of the country; the straw to be changed quarterly. The mattresses and pillows are to be prepared and issued simultaneously with the new iron trestle cots.

Tatties to be used during the night when temperature equals 95°.

278. In consequence of the excessive heat of the season, it was found necessary in some instances to use tatties in barracks and hospitals during the night. In the Artillery hospital at Meerut the thermometer on the 19th May shewed a temperature of 99° at 9 P. M. In the barracks it was equally high, and in the cells the average temperature for the week ending the 23rd May was 102°. A general sanction has now been accorded to the use of tatties in hospitals, barracks, and cells during the night, whenever the temperature equals or exceeds 95° Fahrenheit, provided the wind is not from the east, when tatties are not only useless but appear to be positively hurtful.

Disposal of the sewage of Military Cantonments.

279. The manner of disposing of the sewage of cantonments has recently formed the subject of some discussion. Under the system hitherto in use, it has been removed in closed receptacles to the outskirts of the cantonment and thrown into pits dug for the purpose, the solid filth from latrines and other sources being thrown into one, and the urine into another. The system is most objectionable. It creates a source of danger by massing together so much organic matter and so delaying those chemical changes by which it would otherwise be rendered harmless, and it throws away valuable manure. In the cantonment of Fyzabad the experiment has been tried of utilizing the sewage in the land, and the results so far have been very satisfactory. This system has long been practised in the jails with excellent effect, and its introduction into military cantonments generally is very desirable.

Trench Latrines for Native Troops.

280. In connection with this subject it may be mentioned that a trench system of latrines has been recommended for the use of native troops, and its experimental introduction sanctioned. Owing to the habits of the natives, the proper conservancy of any permanent structure used for this purpose is a matter of great difficulty, and, as a rule, such places have become formidable nuisances. The use of temporary screens moved from time to time over fresh shallow trenches dug over a few acres of ground set apart for the purpose, is much more consonant with native habits, and it obviates the necessity of their having recourse to latrines which are often of the most offensive description, and which as they become quickly excrement-sodden, must prove serious sources of danger. The land when manured in this manner may be cultivated with profit and with the effect of destroying any noxious elements which it may contain.

Statistics of the ten years 1860-1869.

281. The statistics of the 10-year period 1860-1869, which were mentioned in last annual report, are now nearly ready for publication.

Meeting with the Army Sanitary Commission.

282. In concluding this section of the Report, I may mention that during my recent visit to England, I had the advantage of meeting the Army Sanitary Commission, and was appointed a member of a sub-committee which was formed for the purpose of discussing many important questions connected with the health of the Army in India.

SECTION III.

NATIVE TROOPS.

General arrangement of the statistics of Native Troops.

283. The statistics of the native troops are divided into four separate sections: the first includes the Regular Native Army, the second the local regiments serving in Central India, the third the Punjab Irregular Force, and the fourth the Madras regiments which served in the Bengal Presidency during the year. It is very desirable that this division should be preserved. The local corps not only serve in portions of the country reserved in great measure to themselves, but they are also to a considerable extent composed of men who differ in race from the regular sepoys. The Madras regiments again differ in many respects from those of this Presidency, and it is of importance that the statistics of them should be kept distinct.

The mortality of the Regular Native Army was higher than in any year since 1860.

284. The strength of the Regular Native Army during 1869 amounted to 45,952 men, whose names were borne on the regimental rolls, and out of these 938 died, or a ratio of 20·41 per 1,000. Since 1861, when the statistics of native soldiers were first given in detail, the annual death-rate has never exceeded 20·31, and has averaged 17·7 per 1,000. The returns of 1869 are thus peculiarly unfavorable. The death-rate calculated on the total number of deaths occurring among men, whether with or away from their regiments, must always be more or less inaccurate; but the mortality of the past year, when taken in connection with the average strength present on duty and the number of deaths occurring under observation, gives a similar result. Out of an average of 40,080 men 693 died, or a proportion of 17·29 per 1,000. This is the highest death-rate of which there is any record. In 1861 it equalled 16·79, but this was the maximum: the average has been much under this figure, and in 1868 the ratio was only 10·89.

Diseases arranged according to ratio of mortality they occasioned.

285. The 693 deaths which occurred in hospital were due to the under-mentioned diseases, arranged in the order in which they contributed to make up the mortality of the year:—

	Diseases.	Number of Deaths.	Ratio per 1,000.
Died in Hospital.	Cholera	196	4·89
	Fevers	147	3·66
	Respiratory Diseases	79	1·97
	Dysentery	60	1·50
	Diarrhœa	39	·97
	Phthisis Pulmonalis	24	·60
	Apoplexy	22	·55
	Small-pox	17	·42
	Atrophy and Anæmia	14	·35
	Scurvy	11	·27
	Spleen Disease	10	25
	Hepatitis	8	·20
	Heart Disease	7	·18
	Wounds and Accidents	7	·18
	Dropsy	4	·10
	All other Causes	30	·75
Died out of Hospital	... ...	18	·45
	Total	693	17·29

The contrast between these figures and those of 1868 as exhibited in last Annual Report, is very striking, especially as regards cholera and fevers, under both of which heads the mortality has very largely increased. A reference to the comparative table given in that report, in which the statistics of the chief diseases from 1861 to 1868 were ranged side by side, shows how unusually high the ratio of mortality caused by each of them has been during the past year. Owing chiefly to cholera and fevers with their sequelæ, the deaths were most numerous in September and the other months up to the end of the year. The minimum mortality was in April.

The sickness was greater than in any previous year.

286. Judged by the extent of sickness, the statistics of the Regular Native Army during 1869 show results equally unfavorable. Out of an average strength of 40,080, there were 60,164 cases of sickness, or the equivalent of 1501 per 1,000, a higher ratio than in any year since 1861. A glance at Table I shows that the admissions into hospital commencing with a minimum of 71 per 1,000 in January, attained a first maximum of 107 in June. In July the ratio had fallen to 93, but from that month, owing mainly to the great increase in fevers, it advanced till it reached 241 per 1,000 in October. The average number of sepoys daily under treatment equalled 47 per 1,000, and this ratio also is the highest which has yet been attained. The monthly proportion fluctuated between 35 in the hot months and 83 in October.

Diseases arranged in the order of greatest prevalence.

287. Arranged in the order in which they prevailed, the chief diseases stand thus:—

DISEASES.	Number of Cases.	Ratio per 1,000.
Fevers	34,719	866·3
Wounds and Accidents	4,173	104·1
Abscess and Ulcer	3,837	95·7
Dysentery	3,308	82·5
Diarrhœa	2,368	59·1
Rheumatism	2,104	52·5
Venereal Diseases	1,881	46·9
Respiratory Diseases	1,382	34·5
Eye Diseases	997	24·9
Spleen Disease	407	10·2
Cholera	341	8·5
Scurvy	169	4·2
Small-pox	106	2·6
Hepatitis	73	1·8
Phthisis Pulmonalis	70	1·8
Apoplexy	53	1·3
Dropsy	20	0·5
All other Causes	4,156	103·7
TOTAL	60,164	1,501·1

These statistics may be compared with those of the previous eight years as shown in the statement which was given in last Annual Report (page 68), and the generally unfavorable results of 1869 will then appear, not only as a whole, but also as respects the unusual number of admissions into hospital from the chief forms of sickness.

Results in the first group of stations.

288. In the 15 stations situated in Lower Bengal and Assam which constitute the first statistical division of the Native Army, the average strength amounted to 7,462, the admissions equalled 1,417, and the daily number under treatment 49 per 1,000. These ratios are more favorable than those of the Presidency taken as a whole, but the death-rate (20·77) is higher than the total ratio of the Regular Native Army, and in excess of what it was in any of the other groups taken singly. This result is due chiefly to the number of deaths from fevers, bowel complaints, and respiratory affections; cholera was less fatal than in the Army generally. The details of Tables X to XIV show how the sickness and mortality were distribut-

ed over the different stations and regiments. The daily sick rate varied from 33 at Debroogurh to 68 at Berhampore; the admissions which were only 679 at Barrackpore were 2,003 at Gowhatty; the death rate fluctuated between 4·27 at Bhaugulpore to 93·02 among a small body of men at Nowgong in Assam,—this heavy mortality having been entirely due to cholera. Taking individual regiments quartered at these different stations, the most favorable results were in the 11th Native Infantry at Dum-Dum and Alipore, in which the admissions were 1,350 and the death rate 12·95. In the 9th Native Infantry at Barrackpore, the sickness was much less—only 660 cases per 1,000—but the mortality very much higher—33·42. The heaviest loss was in the 41st Native Infantry at Buxa, where the deaths equalled 43·54.

Results in the second group of stations.

289. The returns of the second group are much more satisfactory. Here, out of an average strength of 7,180 men quartered in 12 stations, the daily number of sick equalled 33, the admissions into hospital 975, and the deaths only 9·61 per 1,000. These results are more favorable than those of any one of the other groups. Omitting Chunar, which was garrisoned by a very small detachment, the daily sick varied from a minimum of 22 at Lucknow to a maximum of 75 at Nagode. At this last station the ratio of admissions was 1678 per 1,000, while at Fyzabad it was only 744. At Segowlie the deaths were as 3·27 to the 1,000, but at Dinapore they were 20·68, and at Futtehgurh, out of a small body of men, 24·39. The greatest loss in any one regiment of this group was in the 4th Native Infantry at Allahabad, in which, owing mainly to cholera, the deaths were in the proportion of 30·16. In the 10th Native Infantry at Cawnpore, the death rate (24·56) was also heavy; it was in great part due to cases of inflammation of the lungs occurring on the march from Mooltan.

Results in the third group of stations.

290. In the third group of stations embracing the stations of Rohilcund and the Meerut Division, the statistics are also more favorable than those of the Army generally. With a daily sick rate of 34 and 970 cases of sickness per 1,000, the deaths equalled 11·78. In many of the ten stations concerned, the results were very satisfactory. At Meerut, for example, the daily number of sick was 19, at Bareilly the admissions were 499, and at Moradabad the death rate was only 2·45 per 1,000. At some of the others the ratios, though in excess of those now cited, are low. At Roorkee, owing to great prevalence of fever, the admissions equalled 1,962, and the daily number under treatment averaged 59 per 1,000. At Chuckrata Road also, although in the hills, sickness was very prevalent, and it is remarkable that the deaths among the Native troops here were 29·41 per 1,000, a ratio far higher than at any other of the stations in this group excepting only Delhi, where it amounted to 32·92. Individual regiments in these stations show similar extremes. In the 36th Regiment, Native Infantry, at Meerut, the admissions were only 460 per 1,000; among the Sappers and Miners employed on the Chuckrata Road they equalled 1660; in the 16th Regiment, Native Infantry, the death rate per 1,000 was 6·66; in the 17th Regiment, Native Infantry, at Delhi, it was 49·72, and yet neither of these corps suffered from cholera. The deaths in the 17th were chiefly caused by fevers.

Results in the fourth group of stations.

291. The stations of Agra and Central India occupied by the Regular Native Army number seven, and in these, during 1869, sickness and mortality were very high. Out of an average strength of 3,725 there were 9,447 cases of sickness, or a proportion of 2536 per 1,000. The daily sick rate was 65, and the death rate 19·06 per 1000. A reference to Tables X to XIV shows that all the seven stations in this group suffered from sickness with more or less severity. The smallest ratio of admissions during the year was 2293 per 1,000 at Agra; at Deolee it was no less than 3385. But, excepting cholera which raised the death rate at Agra and Morar to 22·11 and 26·95 per 1,000, the mortality from other diseases was not heavy, varying from 11·24 at Nowgong to 9·69 at Jhansie. In all the

regiments of this group sickness was very prevalent: in the 2nd Bengal Cavalry the ratio of cases reached a maximum of 3140 per 1,000. But in this regiment, although the admissions into hospital were so numerous, the deaths were very few and amounted to only 6·80 per 1,000. In all the other corps classed with it, excepting the 1st Bengal Cavalry, the death rate was heavy, varying from 17·39 in the 7th Cavalry at Nowgong and Nagode to 32·85 in the 33rd Native Infantry at Morar.

Results in the Punjab stations.

292. In the Punjab also the general results were much less satisfactory than those of ordinary years. Out of a strength of 15,413 Sepoys, 26,583 admissions into hospital took place, or a ratio of 1724. The daily sick averaged 52, and the mortality was 20·63 per 1,000. The great number of admissions in the latter months of the year, especially from fever, is remarkable. The total ratio of admissions, which was 94 per 1,000 in July, rapidly increased and attained a maximum of 372 in October. In November it was still 295. Nineteen stations appear in this group and show very different results. The sick rate varied from 15 at Tallagunge to 72 at Phillour and Peshawur. At the first of these stations the admissions equalled 374; but at Loodianah they were 2632, and at Attock 2994 per 1,000. At many of the other stations also, the ratio was very high. The death rate fluctuated much. At Sealkote it was only 3 per 1,000. At Loodianah it was 34, and at Peshawur 57·69. Many of the Regular Regiments in the Punjab suffered heavily. In the 9th Bengal Cavalry at Meean Meer, the admissions were 2850 per 1,000, in the 18th Bengal Cavalry at Peshawur they were 2870, in the 3rd Native Infantry 3130, and in the 19th Native Infantry 3230 per 1,000. The two latter were also at Peshawur. The ratio of deaths in all the Peshawur Regiments was very high, varying, as it did, from 26·84 in the 28th Native Infantry to 82·80 in the Sappers and Miners. In all of them cholera was the chief cause of the mortality.

Results in the Central India Irregular Force.

293. In the Central India Irregular Force which averaged a strength of 4,010 during the year, sickness was much more prevalent than usual, and the deaths much above the average. The admissions into hospital equalled 1,517, the daily sick 48, and the mortality 19·45 per 1,000. At Deolee sickness was most prevalent: the admissions in the Irregular Force at this station were in the proportion of 2659 per 1,000, and the average daily ratio under treatment 79. As only one corps is quartered in a cantonment, the mortality at each station can be ascertained on reference to the regimental statement. In the Erinpoorah Irregular Force the death rate was only 12·66; at Deolee it was 23·97, and at Goonah it reached a maximum of 28·34. The statistics of this group are not so complete as those of the Regular Native Army, and both the amount of sickness and the mortality are to a certain degree under-estimated.

Results in the Punjab Irregular Force.

294. The Punjab Irregular Force suffered greatly from sickness. Out of an average strength of 10,217 there were 21,645 admissions into hospital, or a ratio of 2118 per 1,000. The daily sick rate averaged 59. These results are more unfavorable than those of any other group excepting only that portion of the Regular Native Army quartered in Agra and Central India. As regards mortality the results are more unfavorable still, for the loss of this force during 1869 (25·36) was greater than in any other portion of the Army. This mortality was due in great measure to the severe epidemic of cholera, especially at Kohat. Of the 259 deaths 142, or more than one half, were caused by this disease. As will be seen hereafter, fevers also contributed a considerable number of deaths. Sickness was most prevalent at Bunnoo, where the admissions equalled 2882 per 1,000. At Murdan, although the number of cases was much smaller (1,573), they were of greater severity, as the daily sick rate was 79, or more than double what it was at Bunnoo. The mortality for stations is not shewn in the tables, but the loss of each corps is given in the regimental statement. Here very marked differences appear. In two of the batteries there were no casualties from any cause; in the escort at Bhawulpore the death rate

was only 5·18; in the 2nd Punjab Infantry at Kohat it reached the very high ratio of 125·71 per 1,000, and between these two extremes there are many gradations. Both sickness and mortality have been very much greater in the Punjab Irregular Force during 1869 than in any previous year, of which statistics can be obtained.

Results in the Madras Regiments serving in Bengal.

295. The Madras Troops serving in this Presidency during 1869 formed a body of men averaging 3,710. The statistics regarding them are confined to one general table (No. XV). They occupied the stations of Dorundah, Nagode, Banda, Nowgong, Saugor and Jubbulpore, and, as a whole, may therefore be most fitly compared with those of the Regular Bengal Army forming the fourth group. As regards sickness, the comparison is favorable to the Madras Regiments, for the admissions equalled 1,571, as contrasted with 2,531. But the death rate (22·37) was in excess of that among the Bengal Troops occupying the area above indicated (19·06).

Chief causes of sickness and mortality.

296. The very unfavorable results of 1869 having been pointed out, it will be desirable to show very briefly to what diseases they have been chiefly due. Full particulars regarding cholera have already been given, and it now remains to consider the distribution of fevers, apoplexy, bowel complaints, and venereal affections as they appeared among the Native troops. Fevers have caused 866 admissions per 1,000, or a larger proportion than in any previous year. The highest ratio in any of them was 765 in 1862. The death rate from this cause in 1869 (3·66), however, is not much above the average, and was exceeded by the ratios of 1862, 1863 and 1865. Fevers were at their minimum in the second group, where they amounted to 405, and at their maximum in the fourth group, where they reached 1529 per 1,000. In the Punjab Irregular Force also they were extremely prevalent, and equalled 1470. Their relative prevalence in different stations can be seen on an examination of the third column of Table XI. The wide-spread nature of the epidemic and the very unusual extent of sickness due to this one cause alone in very many cantonments, is well illustrated in this statement. At Bareilly the admissions from fevers (131) were lower than at any other station in the Presidency, and the maximum proportion (2397) occurred at Attock. The ratio of mortality from this disease is not shown by stations, but the actual number of deaths occurring in each is given in Table XII. The fatality of the attacks was but small. Of intermittent cases only ·29 per cent. died, and of the more severe forms the ratio of deaths was 8·01.

Fevers.

Apoplexy.

297. Fifty-three cases of apoplexy were treated during the year, and of these 22 died. These numbers are not large, amounting, as they do, to a ratio of only 1·3 admissions and ·55 deaths per 1,000; but they deserve remark in connection with the unusual prevalence of this disease among the European soldiers, the prisoners, and even the general population, to which reference has been already made. It will be observed that 43 out of the 53 cases occurred in May and June, and there can be little doubt that they were mainly due to the extreme heat of those months. Between 1862 and 1868, the admissions from apoplexy have varied from 0·6 to 0·3 per 1,000, and the deaths from 0·33 to 0·13. The ratios of 1869, although not high in themselves, show a remarkable increase when taken in connection with those of previous years.

Dysentery and Diarrhœa.

298. The admissions from dysentery and diarrhœa taken together amounted to 141 per 1,000,—a ratio somewhat higher than that of 1868, but not in excess of the average of previous years. The death rate from these affections (2·47) is greater than in any year since 1863; but in all the years from 1861 to 1869, the mortality from this cause has not varied by 1·50 per 1,000. In many of the stations of the Lower Provinces, dysentery taken by itself has been very prevalent: at Alipore, in particular, it caused 381 admissions per 1,000. In the Upper

Provinces a high ratio of sickness from this cause is the exception. Diarrhœa was not so generally prevalent in Bengal Proper, but at Alipore and Fort William the admissions were numerous; at Shillong and in the Assam stations it was also common. In the Upper Provinces it is worthy of notice that at several of the stations which did not suffer from cholera, such as Allygurh and Agra, the Native troops had numerous cases of diarrhœa.

Venereal diseases.

299. The admissions from venereal diseases among Native troops have been in the ratio of 46 per 1,000, or less than one-quarter of what they were among European troops. Since 1862 the proportion has varied from a maximum of 59 in that year to a minimum of 43 in 1868. During the last three years the results have been more favorable than previously, but such affections have never been very prevalent among Native troops as a body. The number of cases varies much in different cantonments, and in many of them venereal disease exists to an extent which deserves notice. At Debroogurh, Ferozepore and Mooltan it was at a minimum, and the amount of inefficiency to which it gave rise very trifling; but at Dinapore and Jhansie, the ratios of 193 and 156 are very high, and other stations also show very unsatisfactory results.

SECTION IV.

JAILS.

The average number of prisoners has been greater than in any previous year.

300. The number of persons incarcerated in the different jails of the Bengal Presidency during the year 1869 has equalled a daily average of 61,998, and this number is much in excess of what it has been in any previous year. Between 1859, when some of the jails had not yet been re-established after the mutinies, to 1866, a year of great famine in Bengal and Behar, the average jail population varied from nearly 46,000 to more than 57,000. In 1867 the number again fell to 55,000; and in 1868 there was little difference. The details for the different Provinces shew that the large increase in 1869 was not due to any one of them. Excepting Bengal Proper where there was little difference in the strength from what it had been in previous years, all the groups shew a decided increase. In the second, fourth and fifth of them this is most marked.

Large increase due to privation.

301. There can be little doubt that these results have been due to the very wide-spread distress which characterized the year. Petty crimes, ascribable in many cases to want, have been more than usually prevalent, and this fact is more strikingly illustrated by the large increase in the number of persons confined, than by the higher average. In the North-Western Provinces 9,183 more individuals were convicted in 1869 than during the year previous. In the Punjab the excess was 3,053. In Oudh compared with the four preceding years, the committals were more numerous by 1,428, and the total population was 2,218 greater. As Dr. Sutherland, the Inspector General of Prisons in this Province, remarks—"Theft is the crime which fills the jails, and its prevalence is regulated in great measure by the price of food and demand for labor."

Illustrated by the general decrease after the rain-crop harvest.

302. The intimate connection between want and crime is illustrated by the average numbers in the jails during each month of the year. Commencing with a minimum in January the numbers rise with little fluctuation till they reach their maximum in September and then again commence to decline. With the reaping of the rain-crop harvest, food became cheaper and more plentiful, and petty crime decreased. This truth is shewn not only in the general table but also in the details of which it is composed.

Same causes have increased sickness and mortality during 1869.

303. The same causes which have produced such a marked increase in the number of prisoners during 1869, have exerted a very unfavorable influence on the statistics of sickness and mortality. Very many of those who were received during the year were suffering from the effects of want. Their health was frequently impaired from this cause, and in many instances weak and emaciated, they seemed more fit to become inmates of a poor-house than of a prison. It is not surprising that in a body of human beings in which such a class was largely represented, sickness of a severe type has been prevalent, and mortality more than ordinarily heavy. In many jails, moreover, the influx of new prisoners was so large that the accommodation was insufficient, and overcrowding to a greater or less extent was unavoidable. Under such circumstances, and considering also the very unhealthy character of the year, it was to be expected that the statistics of 1869 would shew unsatisfactory results, and the fact that these results are not much more unfavorable than they were, is in

itself strong evidence of the great improvements which have been effected of late years in the sanitary condition of the jails.

General results of 1869.

304. In last annual report when reviewing the statistics of prisoners in the Bengal Presidency during ten years, it was shewn that the results of 1868 had been more favorable than those of any one of its predecessors. The ratios of daily sick which had varied from 57 to 32 had fallen to 29, the admissions which had never been lower than 1079 and had been as high as 1491 per 1,000 had been reduced to 941, and the death rate, which had been as high as 110 per 1,000 in one of these years and had never been under 38·32, stood at 30·28. The results of 1869, although less favorable than those of 1868, will bear comparison with those of many of its predecessors. The daily number of sick has equalled 31, the admissions into hospital 1,019, and the deaths 42·81. Judged by the two first of these standards, 1869 comes next to 1868, by the last of them it follows 1868 and 1867.

Chief causes of mortality in 1869.

305. Two thousand six hundred and fifty-four deaths occurred during the year. Of these by far the largest number was due to bowel complaints, and then come cholera and fevers. To these three diseases nearly 1,800 of the casualties were due. Arranged according to the ratio of deaths which was due to them the different diseases stand in the following order:—

Dysentery and Diarrhœa	16·21	per 1,000
Cholera...	6·24	"
Fevers	6·18	"
Respiratory diseases...	3·74	"
Atrophy and Anæmia	2·26	"
Phthisis Pulmonalis	2·18	"
Apoplexy	1·42	"
Dropsy	·74	"
Wounds and accidents	·45	"
Spleen disease	·34	"
Heart disease	·21	"
Hepatitis	·20	"
Small-pox	·13	"
Scurvy	·03	"
All other causes	2·48	"
TOTAL ...	42·81	"

Monthly fatality from the chief diseases.

306. The manner in which the deaths from each of these diseases were distributed over the different months of the year can be seen on examining the upper portion of the opening table. Apoplexy was chiefly confined to the unusally hot months of May and June, and cholera was most fatal in July, but all the other chief diseases were more prevalent and fatal in the latter months of the year. This remark more particularly applies to fevers, bowel complaints, respiratory diseases, and that peculiar low condition of vitality which is so frequently seen in Indian convicts, especially in a time of general distress, and which comes under the general head of atrophy and anæmia. The unhealthy influences of 1869 lasted till late in the year even among the troops, and the cold weather coming early after a late and heavy rainy season in the Upper and Central Provinces must have been especially trying to men weakened by privation and disease.

Chief forms of sickness in 1869.

307. The admissions into hospital, 1019 per 1,000, as has been already stated, were somewhat more numerous than in the year previous, but less than in any one of the other ten years. This favorable result is all the more worthy of notice, because the ratio of cases of sickness among the troops has been so unusually high in the past year, and the returns shew that the prisoners suffered from prevailing sickness very much less than either European or Native soldiers. Among the

former the admissions into hospital were 1729 and among the latter 1501 per 1,000. The cases of sickness among the prisoners were—

Of Fevers	468	per 1,000
Dysentery and Diarrhœa	188	„
Abscesses and ulcers	96	„
Wounds and accidents	35	„
Respiratory diseases	36	„
Rheumatism	20	„
Venereal diseases	18	„
Cholera	14	„
Eye diseases	14	„
Atrophy and Anæmia	10	„
Spleen disease	6	„
Apoplexy	5	„
Phthisis Pulmonalis	4	„
Scurvy	4	„
Dropsy	2	„
Small-pox	2	„
Hepatitis	1	„
„ All other causes	94	„
TOTAL	1019	„

Excepting cholera and apoplexy the relative position held in the scale by the different diseases is almost identical with what it was in the year previous.

Monthly prevalence of each form of sickness.

308. The number of admissions into hospital and the relative prevalence of each form of disease in each month is clearly seen in the lower part of Table I. Sickness reached its maximum in October when the admissions equalled 119 per 1,000 compared with 58 in January. Cholera which was prevalent in May and also in August reached its maximum in July. Of 307 cases of apoplexy, 285 occurred in May and June. Fevers were at their height in October. From dysentery and diarrhœa the greatest number of admissions took place in August. Respiratory diseases, phthisis, rheumatism and atrophy were chiefly prevalent in the latter months of the year.

General results in the first group were very favorable.

309. Compared with those of former years the results in the first group of jails during 1869 were extremely favorable. The average number of daily sick was but one in excess of what it had been in 1868, in all respects the most favorable of the preceding ten years, while the proportion of admissions and deaths were less than in any previous year. Twelve hundred and forty-five cases of sickness and 50·14 deaths per 1,000, as these ratios stood in Lower Bengal in 1869, do not represent a very healthy condition, but they compare most favorably with sixteen and seventeen hundred admissions and over 100 deaths per 1,000, as they were in former years. All the chief diseases,—cholera, fevers, bowel complaints, and respiratory diseases,—stand higher in this group than the general average of the Presidency, but as will presently be seen some of these were more prevalent and fatal among the prisoners in other parts of the country than they were in the Lower Provinces.

Excessive mortality in many jails of this group.

310. In many of the fifty jails which are embraced in this group the sickness and mortality were as in former years excessive. In fifteen of them the ratio of admissions exceeded 1500 per 1,000. At Pubna it was 2583, at Debrooghur 2825, at Tezpore 3011, at Sumbulpore 3103, and at Malda 3569. In eighteen of them the death rate exceeded 50 per 1,000, and in seven of these it was over 100 per 1,000. Cholera in the extreme cases contributed more or less to the mortality, but the admissions and deaths from other causes were very numerous. Fevers were nowhere very fatal; the highest ratio of prevalence was at Burdwan, where they amounted to 1276 per 1,000. At Rungpore, Backergunge, Gowhatty and even at Alipore, the mortality from dysentery and diarrhœa

was heavy. At Rungpore, 13 deaths out of 64 were ascribed to atrophy and anæmia.

In the second group sickness was less prevalent, but mortality higher than in 1868.

311. In the second group of jails with 727 admissions per 1,000, and an average ratio of 23 always sick, the death rate was 41·59. Compared with the statistics of previous years as shewn in last year's report, sickness was less prevalent than in any former year, but the mortality higher than in 1867. From nearly all diseases the ratio of admissions and of deaths was smaller in this group than in Bengal Proper. In these respects the 39 jails which are concerned shew very marked differences. The daily sick rate varied from 4·7 per 1,000 at Etah, to 52 at Humeerpore, and 129 at Nagode. At this last station the admissions equalled 2293 per 1,000, while in the Lucknow District Jail they were only 222, and at Ghazeepore only 139. Similar wide differences appear in the mortality rates. In the Etah Jail only 4·7 out of every 1,000 prisoners died. At Humeerpore the proportion was 125, at Goruckpore 165, and between these extremes there are many gradations. Such differences are in a measure to be accounted for by the absence or prevalence of cholera, but under other heads also, as will subsequently be shewn, when considering the chief diseases from which prisoners suffer, the discrepancies are quite as marked.

The results in third group much more unfavorable than in 1868.

312. In the third group of jails in 1868 the ratios of daily sick, of admissions and of deaths were respectively 46, 1,338 and 27·48 per 1,000. The results of 1869 stand in very unfavorable contrast with these figures, for the number of daily sick has equalled 54, the admissions 1738, and the deaths 76·24 per 1,000. The jails composing this group are situated chiefly in the Central Provinces, and the unfavorable results are in a great measure due to the very severe epidemics of cholera and fever which visited that part of the country. In all the 22 jails of this group, excepting Baitool and Nursingpore, sickness was extremely prevalent, and the admissions exceeded 1000 per 1,000 of strength. In twelve of them they exceeded 1500 per 1,000. At Beaur the ratio was 3405. In many of these jails also the mortality was very heavy. Leaving Nimar out of consideration, as the number of prisoners confined there is small, the death rate varied from a minimum of 23·5 at Chindwarra to a maximum of 234·23 at Beaur. At Ajmere 12 prisoners are reported to have died of fever, but with this exception fevers, although very common, were not in many instances fatal. Dysentery and diarrhœa were the chief causes of death.

The results of the fourth group are less satisfactory than in any of the previous three years.

313. The statistics of the fourth group of jails are much more favorable than those which have just been described. The daily proportion of sick was 20, the admissions 705, and the deaths 29·03 per 1,000,—ratios which are in all cases less than half of those of the third group. But compared with the history of the jails of this same group in previous years, the returns are by no means satisfactory, for they shew a greater amount of sickness than in any year since 1864, and a greater mortality than in any year since 1865. The Section of Table VIII, however, in which the statistics of the 18 jails composing this group are given separately, embraces details of a very varying character. In most of them the daily sick rate was under 20 per 1,000. At Shajehanpore it was 30 and at Almorah 45. The admissions into hospital, which were only 388 per 1,000 at Budaon, were 1665 at Seharunpore, and 1795 at Almorah. Similar marked differences appear in the death rate. At Allyghur the mortality was 10·50, and at Mozuffernuggur 66·18 per 1,000.

In the Punjab the sickness and mortality were greater than of late years.

314. In the Punjab out of an unusually large number of prisoners, greater than in any year since 1855, 393 were daily in hospital, or an average of 31 per 1,000. The admissions equalled 1156 and the deaths 33·36. A reference to the ten-year table given in last annual report shews that these ratios are considerably higher than they have been for some time previous.

The proportion of daily sick and of admissions is greater than in any year since 1864, and the deaths more numerous in relation to strength than in any year since 1865. Great variations appear also in this group when the statistics of individual jails are taken separately. The daily sick, for example, which was only 9·6 per 1,000 at Goojerat was 89 in the Lahore Female Jail, and 93 at Rawulpindee. The admissions fluctuated between 126 per 1,000 at Rhotuck and 2800 at the Lahore Female Jail. In many of them the ratio exceeded 1500 per 1,000. At Sealkote the deaths were 5·35, at Rawulpindee they were 123 per 1,000. Nor are these great differences to be explained by the appearance or non-appearance of cholera, for out of the 29 jails of the Punjab, only four suffered at all from the disease. Particulars regarding these cases have been already given in the first section of this report.

Great prevalence of fevers in 1869, especially in the third and fifth groups.

315. The high ratios, especially of admissions into hospital and of daily sick, here as in the other provinces are chiefly ascribable to fever, and the extraordinary prevalence of this disease during the past year requires special attention. The total cases of fever averaged 468 per 1,000 prisoners, exactly the same proportion as in 1867, but the mortality from this cause in place of being 4·82 equalled 6·18 per 1,000. In the first two groups fevers were less frequent during 1869 than usual. In the fourth group also, as a whole, there was no very great prevalence of the disease, but in the third and fifth groups the cases were extremely numerous. In the first of these, which represents Central India, the admissions equalled 773, and in the Punjab they were 780 per 1,000; a reference to Table IX shews how severely many of the jails in these two groups suffered from fever. At Raepore the admissions under this head alone equalled 975 per 1,000, at Mundla 1014, at Nimar 1392, at Delhi 1227, at Kurnal 1379, at Lahore 1855, and at Rawulpindee 1956. In this last-named prison two epidemics occurred, and although both are included under the one head of fever, two very different diseases are indicated, one a specific contagious fever which raged among the prisoners in the earlier part of the year, and the other the malarious fever from which they suffered in the later months in common with the free population of the country.

Special instances of prevalence of, or exemption from, fever.

316. In all the provinces special instances appear in which individual jails, apparently situated within the area of the epidemic, enjoyed comparative immunity from fever, and in some cases a body of prisoners separated by only a few miles from localities where the jail suffered severely have almost entirely escaped. For example at Delhi, the fevers, as already stated, equalled 1227 per 1,000. At Hissar they were 438, while at Rhotuck which lies between the two they were only 46. In other provinces, the reverse has been seen; while the prisoners, as a whole, have not been attacked to any great extent, individual jails have suffered much. As instances of this may be cited Burdwan, Malda, Pubna and Sumbulpore in the first group, Nagode and Banda in the second, and Seharunpore in the fourth.

Great part of the mortality from fevers in Punjab due to Rawulpindee Jail.

317. In the third group the deaths from fevers amounted to 7·09 per 1,000, nearly double the mortality due to this cause in either the first, the second or the fourth, but in the Punjab the ratio was much higher still, for here it equalled 14·54. Great part of this was due to the outbreak of contagious fever in the Rawulpindee Jail which has been already mentioned. Allusion was made to this epidemic in last annual report, and since then a very full report on the subject has been submitted by the Civil Surgeon, Dr. Fairweather. Of the 180 deaths which are returned from fever in the jails of the Punjab, 94 or more than one-half occurred among the prisoners at Rawulpindee, and of these 88 took place during the first six months of the year when the epidemic of malarious fever, from which the population in this portion of the country suffered so severely, had not yet commenced.

The fever in the Rawulpindee Jail reported to be true typhus.

318. The fever in the Rawulpindee Jail was very carefully watched by Dr. Fairweather, and from notes of the symptoms taken at the bedside from day to day, from the observance of the distinctive rash, and from the result of *post-mortem* examinations, he has come to the conclusion that it was a true typhus. In this opinion Dr. Gray, the Officiating Inspector General of Prisons in the Punjab, who had opportunity of seeing the disease, entirely concurs. As to the origin of the fever opinions differ. Both Dr. Lyons, who was in charge of the jail when the epidemic first commenced, and Dr. Fairweather, who was Superintendent and Medical Officer when it was at its height, are of opinion that it was generated by over-crowding and other insanitary conditions. Satisfactory evidence in support of such an opinion is wanting. A large gang employed at the Sohan bridge works was the first to suffer from unusual sickness, and free communication was kept up between them and the inmates of the jail. The contagious nature of the fever was established beyond all doubt, and in an over-crowded jail the disease had every facility for spreading.

The prisoners suffered much less from fever than the troops at the same stations.

319. Great as was the prevalence of fevers among the jail population, it is remarkable that the prisoners enjoyed a decided immunity from the disease when compared with the troops, whether European or Native. The comparative ratios of admissions under this head for the Presidency, as a whole, and for the several groups stand thus:—

	PER 1,000 OF AVERAGE STRENGTH.		
	European Troops.	Native Troops.	Prisoners
1st Group	300	605	527
2nd "	360	405	241
3rd "	423	478	279
4th "	1008	1529	773
5th "	1110	1199	780
The Presidency as a whole	750	866	468

As the places represented in this general statement do not altogether correspond, the comparison is not perfect, but it cannot be said that many of the jails are situate in positions which are more healthy than the cantonments. The reverse is more near the truth. Taking individual stations, although a few exceptions occur, the general fact remains that, as a rule, the prisoners have suffered from the prevailing fever to a much less extent than either European or Native soldiers. At Benares, for example, the proportion of cases among the prisoners in the Central and District Jails was 288 and 189 as compared with 472 and 421 among British soldiers and sepoys. In the Lucknow jails they were only 45 per 1,000, while in the cantonments 211 out of every 1,000 European and 391 of every 1,000 Native troops were attacked. Similar marked differences, and all of them in favor of the jail population, appear on reference to the statistics of Allahabad, Jhansie, Jullundur, Ferozepore, Mooltan, Sealkote, and other places which might be named.

Dysentery and diarrhœa though only slightly more prevalent were much more fatal than in 1868.

320. The admissions from dysentery and diarrhœa, which stood at 183 per 1,000 in 1868, were 188 in 1869, but the deaths from this cause had risen from 12·06 to 16·21. In Bengal Proper the ratio was 18·20,—the lowest death rate under this head which has yet been recorded,—but all the other groups shew an increase. In Nagpore and Central India the ratio was no less than 33·79 per 1,000. A reference to Tables IX and XI shews what

a prominent place dysentery and diarrhœa hold as a cause of sickness and death among prisoners in India. In the first group the admissions from these affections vary from 65 at Midnapore to 979 at Sumbulpore; in the second from 42 at Etah to 543 at Goruckpore; in the third from a total absence of the disease in some of the small jails to 837 at Beaur; in the fourth from 46 at Mynpoorie to 205 at Agra; in the fifth from 18 at Rhotuck to 270 at Peshawur. These results have no doubt been due in no small degree to the effects of want in particular districts, and the impoverished condition of many of the new prisoners received during the past year; but such extremes in different jails lying within the same province, and subject to similar climatic influences occurring as they do more or less every year, point to some local and removable causes.

Respiratory diseases were in the same ratio as in 1868, but more fatal.

321. Respiratory diseases, as they occurred among the prisoners during 1869, do not call for any special remark. The ratio of admissions from this cause exactly equalled what it was in 1868—30 per 1,000, but the deaths had risen from 2·59 to 3·74. These affections were thus of a more fatal character in the past year than they had been in the year previous. In 1868, the ratio of fatal cases per cent. of those treated was 8·48; in 1869 it was 12·29. Referring to individual jails, the admission of 175 cases per 1,000 of strength at Sooree, of 181 at Tezpore, of 94 at Nagode, 131 at Jubbulpore, 151 at Almorah, and 97 at Kohat, deserve attention.

Apoplexy was fatal beyond all precedent.

322. Apoplexy is comparatively so rare among prisoners that it usually calls for no remark; but the occurrence of 88 deaths among them in 1869 from this cause is worthy of notice. The annexed return shewing the prevalence and fatality of apoplexy in the different groups of jails, during each of the last ten years, shews that the admissions from this cause have equalled 5 per 1,000 compared with a maximum of 1·6 in any previous year, and the deaths have been double what they ever were before. This unusual result is, no doubt, to be ascribed to the delay in the commencing of the rains, and to the extreme heat of the season. Of 88 casualties due to this disease, 76 occurred in May and June, when the heat was at its maximum.

Year.	Per 1,000 of average strength.											
	1st Group.		2nd Group.		3rd Group.		4th Group.		5th Group.		Total for Presidency.	
	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
1860	1·0	·70	2·2	1·68	0·4	·40	1·0	·52	0·5	·20	1·1	·74
1861	0·6	·50	1·4	1·23	0·4	·20	1·4	·41	0·6	·55	0·9	·63
1862	1·3	·88	0·6	·43	0·6	·19	0·8	·59	0·3	·10	0·8	·49
1863	0·5	·27	0·4	·34	1·0	·81	0·5	·37	0·8	·83	0·6	·40
1864	0·7	·62	1·0	·78	0·4	...	0·7	·39	1·2	·94	0·9	·63
1865	1·2	·89	1·5	·86	0·6	·57	1·4	1·04	3·1	1·53	1·6	·99
1866	0·6	·24	1·9	1·17	...	...	0·6	·51	0·7	·37	1·0	·56
1867	0·6	·58	0·4	·12	1·8	·68	0·1	...	1·6	1·05	0·8	·46
1868	0·7	·53	0·3	·23	0·9	·45	0·4	·40	1·1	·36	0·7	·38
1869	0·4	·39	10·2	2·53	2·8	1·46	6·8	1·56	1·8	·81	5·0	1·42

New series of Annual Jail Statistical Forms adopted.

323. In last annual report it was mentioned that a special Committee, which had been appointed to prepare a new standard series of Annual Jail Statistical Forms, to embody the information hitherto supplied by various returns from the different Governments and Administrations, had submitted a series of such Statements for adoption. This series, after having been forwarded to the local authorities for opinion, and after some alterations, has been accepted, and will in future be employed.

Disparity in the amount of salt allowed to prisoners in different provinces.

324. Under orders from the Right Hon'ble the Secretary of State, an investigation was instituted regarding the amount of salt allowed to prisoners in the different provinces. The quantity was found to vary from 100 grains in the North-Western Provinces and Oudh to one ounce a day in Madras.

The avoirdupois ounce contains 437·5 grains. The prisoners in the North-Western Provinces and Oudh thus receive less than one-half the amount of salt which is allowed to those in Bengal, Bombay, the Punjab and the Central Provinces, and less than one-quarter the amount allowed to those in Madras. An exact comparison cannot be made with reference to British Burmah, as the salt is served out there partly in the shape of salt fish, and its quantity is not therefore accurately known, but the amount may be taken as lying somewhere between the Bengal and the Madras scales. These facts would seem to imply that there must either be undue waste in some provinces, or too severe a restriction in others. In considering the question, however, the nature of the diet and the habits of the people must be taken into account. The percentage of salts contained in wheat is nearly four times what is contained in rice; and even in flour, entirely freed from bran, the proportion of salts is still double what exists in rice. There can be little question, therefore, that a rice diet should be supplemented with much more salt than one of wheat.

If this explanation be adopted, it at once explains why the prisoners in the North-Western Provinces, where the diet consists almost exclusively of *attah* or wheaten flour, not freed from bran, should be allowed only one-half the amount of salt granted to the prisoners in Bengal, who live almost entirely on rice.

Taking all the circumstances into consideration, and especially the experience of the North-Western Provinces, it was recommended that an allowance of salt, similar to that granted to the prisoners in that part of the country, should be held sufficient for a diet composed of dry grains, but that with rice a double quantity should be given. According to this view the half ounce now allowed to prisoners in Bengal might be retained. The heads of the Jail Department in the Punjab and Oudh are of opinion that 100 grains is too little. To meet their objections in a measure, and also to regulate the allowance by one standard, one-quarter of an ounce, or 109 grains, might be granted to all prisoners not fed on rice. There would thus be two scales, one of half an ounce for rice-eaters, and the other of quarter of an ounce for all others. The exceptionally large quantity of one ounce now sanctioned in Madras appears to be excessive, and might be reduced. Enquiry should also be made into the actual amount of salt served out to the prisoners in British Burmah in the shape of salt fish, and a corresponding reduction effected. Experience, however, must be the great guide in such matters, and the habits of individual races must be considered. It was therefore proposed to make the reduction in these two provinces experimental, and subject to report at the end of twelve months; certain jails to be selected in each, and the results in them compared with those in which meantime the present allowance might be retained.

SECTION V.

GENERAL POPULATION.

Reports from local Sanitary Commissioners will be specially important owing to the great sickness of the year.

325. In discussing the cholera of 1869 in the first section of this report frequent reference has been made to facts concerning its appearance among the general population. The information on this point has been derived partly from the special reports of Civil Surgeons, and to some extent also from data supplied by the local Sanitary Commissioners. Dr. Smith has favored me with a general summary of the history of cholera in the Lower Provinces during the past year; from Dr. DeRenzy I received some months ago a copy of the statements shewing the vital statistics of the Punjab for 1869, but, with the exception of Oudh, none of the complete reports from the Sanitary Commissioners with the local Governments and Administrations for 1869 have yet reached me. I am therefore unable to give any general summary of their contents, to examine the facts regarding the general distribution of disease among the people, to show what steps have been taken to improve the public health in the different provinces, and what sanitary progress has been made during the year. In the end of May I submitted to the Government a general review of the sanitary reports for 1868, and I hope soon to be in possession of all the data for 1869. The year was one of very great sickness. Diseases, more directly arising from excessive and unusual heat as well as from want, were succeeded by severe epidemics of cholera and fever, and it is of special importance that the facts regarding all of them should be very carefully collected and placed on record.

Orders regarding registration of deaths.

326. Leaving any review of the sanitary history of the country generally during 1869 to be undertaken when these reports shall have been received, I shall confine myself chiefly to a statement of the measures which have been adopted since last year to obtain more accurate information for the future. Among these the most important has been the issue of orders for regulating the registration of deaths and causes of deaths among the people. The means for this purpose detailed in last annual report have been adopted with some slight alterations. It has been considered advisable for the present to make no attempt at registering either marriages or births. In many parts of the country and especially in Burmah, it is extremely difficult to define what is to be considered as a marriage: in all of them the registration of births with any accuracy is beset with much greater difficulties than the registration of deaths. The record of deaths, according to the new forms, is therefore alone insisted on, and steps are being taken by the different Governments to carry this into effect.

Orders regarding a uniform system of recording vaccinations.

327. In connection with these statistics it may be mentioned that orders have also been issued prescribing a uniform system for shewing the extent of vaccination and the results in every part of the country in which these operations are conducted. Hitherto the statements employed by the vaccine establishments in the different provinces have been very various and all of them more or less incomplete. The new forms have been devised in such a way as to give detailed information regarding the number of vaccinations and the amount of success in each town or country circle, while at the same time they will shew what the average cost of each operation has been, and what aid Municipalities, Native States, or landlords have contributed in

spreading the benefits of this most valuable prophylactic. The annual loss of life from small-pox in India is very great, and in 1869 the disease was unusually prevalent. In the Punjab alone the deaths from it exceeded 53,000. It is very important that the effects of vaccination among the people should be tested by the number of deaths from small-pox, and it has therefore been decided that in the new forms the vaccination circle, regarding which particulars will be given, shall correspond with the mortuary registration circle. In this way the work of the Department will be thoroughly tried and data will become available to prove to the people beyond all doubt the benefit of a safeguard which they are still, as a rule, very unwilling to accept, and make them in time anxious to supply for themselves a protective agency which the Government can never provide for the whole population of India.

Importance of the local sanitary reports.

328. In submitting a general review of the sanitary reports for 1868, I took occasion to offer a few remarks on the manner in which these reports should be prepared. The subject is of so much importance and so intimately connected with sanitary progress that I shall extract what was then said regarding it :—

General remarks on their preparation. Importance of mortuary statistics.

> "Having briefly reviewed the reports for 1868, I propose now to offer one or two suggestions for the preparation of future reports. I do not recommend that the local Sanitary Commissioners should be tied down to one uniform method of preparing them, but a few general observations on the subject may not be altogether without use. As the collection of accurate statistics of deaths in the different parts of the country must form the true basis of all sanitary progress, so the annual statements of such mortality must form the groundwork of the sanitary history of the year. A prominent place should therefore be assigned to the results of registration, and an analysis should be given of these results shewing how far they are reliable and how far improvement is still required, what measures have been adopted during the year for rendering the system more perfect, and what still remains to be done. The series of tables which has been introduced under the orders of the Government will contain all the information desired, and there is no more important duty for a Sanitary Commissioner than to scrutinize the registration and to do all in his power to improve it. All the reports for 1868 contain vital statistics of the population except Bengal, and here the difficulties are even greater than elsewhere. I am not aware how far registration has yet been established in the Lower Provinces, but if the obstacles to its general introduction prove insuperable, it might be brought into play over the area of one division and thence gradually extended. Several of the Sanitary Commissioners already follow the course now recommended and make the collection of the mortuary statistics the groundwork of all future progress, but in some of the provinces registration has not received that attention which its importance demands.

History of the chief diseases during the year.

> "A special chapter should next be devoted to a general history of each of the chief diseases throughout the year,—cholera, small-pox, fevers, and bowel complaints,—the four which are entered in the annual tables; and in the event of the prevalence of any one of them, and especially of cholera, special efforts should be made to obtain reliable data and to give a connected account of the epidemic shewing the distribution of the disease and any facts of interest connected with its progress. In some of the reports these data are spread over a number of different district reports, and it is quite impossible to arrive at the facts without an infinity of labor. The object of one report for a province is to collect the facts and throw them into a connected narrative, advantage being taken of the detailed information procurable to shew how far local conditions affected the results and what were the causes why particular places suffered more than others.

Meteorology and condition of the people.

> "And in order to judge of this general history, information on two most important subjects is very necessary: we must know what has been the meteorology of the year,—whether there has been anything peculiar either as regards temperature, rain-fall, or other atmospheric phenomena,—and we must also know what has been the general condition of the people as regards abundance of labor, rate of wages, and price of food; how far any one or other of these has been unusual, and how far it appears to have affected the health of the population. These questions should form the subject of a separate chapter.

Record of personal inspection and proceedings.

> "A fourth chapter might well be taken up with a short account of the work done by the Sanitary Commissioner during the year, of any tour which he may have undertaken, of the general condition of the places visited, and the measures proposed for their improvement. When such a tour has been undertaken with a view to enquire into the circum-

stances connected with any outbreak of disease, the particulars may more conveniently be given in connection with the history of the outbreak in Chapter II; but the general course and extent of the investigation should also be stated in Chapter IV. Abstracts of special inspection reports of towns and districts also would appear under this head.

Importance of sanitary tours.

"In connection with this subject I would observe that it is of the very greatest importance, especially in connection with an unusual outbreak of sickness, that the Sanitary Commissioner should make a tour and ascertain the facts from his own personal observation. Coming in contact with District Officers and with the people themselves will act as a great stimulus to sanitary reforms; and, although the Sanitary Commissioner's other duties are many and laborious, he may find time for this important work. * * * * *

Sanitary progress during the year.

"In a fifth and last chapter a short summary might be given of any sanitary progress which had been effected during the year. I propose to devote a special portion of each annual report to this question, and it is therefore important that the data from each province should be available in a tangible form. I do not anticipate that such statements will every year contain a record of some marked reform. Progress must be slow, but it will be satisfactory to ascertain exactly how far the measures already in force are working, and whether any advance has been made during the year.

Reports to be concise and to the point.

"The report should be concise and to the point; and, with reference to this very important requirement, it will not be advisable, as a rule, to reprint district reports in full. Their contents should rather be incorporated in the general history of the year, the details under each head being embodied in the chapter to which they properly belong. All extraneous matter should be avoided.

Reports to be of one size.

"It is very desirable that all the reports should be of one size of page. On this point orders were issued to Madras and Bombay, but, so far as I am aware, no instructions were given for the guidance of the Sanitary Commissioners with the local Governments and Administrations. For the tables of vital statistics which have been ordered, this is almost a necessity, and it is advisable on other grounds. The reports for 1868 differ materially in this respect, especially those for Bengal and British Burmah.

To be submitted early.

"The early preparation and submission of the report is a matter of very great importance, and regarding which the orders of the Government have already been issued. If the report be made a short, plain record of facts such as I have proposed, one obstacle to its early preparation will be removed. Unless the reports are received each year at an early date, it will be impossible for me to comply with the orders of the Secretary of State and submit a general report within the time specified."

These suggestions were approved of by the Government and have been issued for the information and guidance of the local Sanitary Commissioners.

Return of deaths among the general population of Military Cantonments.

329. During 1869 monthly returns have been received shewing the deaths among the general population of the Military Cantonments, and a table has been prepared exhibiting the results for the year; but, as the statistics are still capable of much improvement, it is not advisable that it should be printed. With the commencement of 1871, I propose that a similar system should be adopted with reference to these records as has now been introduced among the people generally. With this alteration and with a more accurate registration, the data supplied will be of much value.

J. M. CUNINGHAM, M. D.,

13th August 1870. *Sanitary Commr. with the Govt. of India.*

APPENDIX A.

A REPORT

ON THE

MICROSCOPIC OBJECTS FOUND IN CHOLERA EVACUATIONS, &c.

BY

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CONTENTS.

PART I.

PAGE.

CONCERNING THE THEORY OF THE FUNGOID ORIGIN OF CHOLERA AND THE MICROSCOPIC OBJECTS FOUND IN CHOLERAIC EVACUATIONS.

Epitome of Professor Hallier's published views regarding the existence of a cholera-fungus. Its *cyst*, its *spore*, and its *micrococcus* ... ... 129—131

SECTION I.

The bodies found in choleraic evacuations which may be said to bear some resemblance to *cysts* ... 131—140
The cholera bodies of Drs. Budd, Brittan, and Swayne 132
The effect produced by various re-agents upon these cyst-like bodies 133
The nature of these bodies 134
The various methods adopted during the course of the investigation with the view of ascertaining whether *other* cyst-like bodies could be artificially developed in cholera stools.
Illustration I.—Three cultivations of cholera evacuation in various media 135
Illustration II.—Cultivation experiments with the contents of the small intestine of a person who had died of cholera 136
Description of the Isolating Apparatus used in some of the experiments ... ...
Illustration III.—Three cultivations of choleraic discharge, two of the samples having been placed upon slices of fruit 137
Illustration IV.—Cultivation of a choleraic discharge obtained from a locality where the disease was epidemic 138
Illustration V.—Cultivation of *ordinary* alvine discharge 139
Conclusions drawn from the foregoing experiments 140

SECTION II.

The bodies found in choleraic evacuations which may be said to bear some resemblance to *spores*. 141—153

1. *Globules of a fatty nature.*

Effect of re-agents upon them 141
Their artificial production 142

2. *Altered condition of blood-cells.*

Exact microscopic appearance of such 143
The blood-cells observed to protrude and retract portions of their substance 143
Precisely similar appearances observed in "*chylous urine*" in which the embryos of a worm were discovered 143

3. *The corpuscles associated with the flocculi in rice-water stools.*

Illustration I.—The changes which occurred in the appearance of these corpuscles, which when first seen were hyaline 144
The effect produced by various re-agents upon them ... ...
Illustration II.—The same as the foregoing, except that the corpuscles were granular when first examined 145
Illustration III.—The same as the foregoing, the hyaline and granular appearance of the corpuscles being evident in the same preparation 145

4. *Globular conditions of certain Animalculæ.*

Illustrations I—III.—In which the various stages of these bodies, hitherto observed, are described 146
Are any of these four classes of corpuscles peculiar to cholera? 149
Significance to be attached to the presence of the *first* and *second* classes of bodies referred to ... 149
Significance to be attached to the presence of *fourth* class of bodies referred to 150
Significance to be attached to the presence of *third* class of bodies referred to ... 151
Probable identity of the last named with the "peculiar corpuscles" of Professor Parkes 152
Reasons for concluding that they are not, as generally stated, disintegrated epithelial cells ... 152
Their probable nature 153

SECTION III.

Observations as to the nature of the minute molecules (*micrococcus*) observable in cholera stools, preceded by illustrative experiments of the changes which were seen to occur in other solutions of organic matter ... ... 153—164

PAGE.

Illustration I.—The changes which were observed to occur in solutions of organic matter (meat) under three different conditions 155

Illustration II.—The changes which were observed to occur in filtered solutions of ordinary alvine discharges 157

Illustration III.—The changes which were observed to occur in two preparations of an ordinary alvine discharge which had been placed on the same slide 159

Various developmental changes observed, from simple molecules to the advent of a "nucleated" infusorium 159

Illustration IV.—The changes which were observed to occur in five specimens of choleraic dejecta under varying conditions 162

Lessons to be derived from the experiments illustrating this section 164

Summary of conclusions drawn from all the experiments 164

PART II.

REMARKS REGARDING THE SOIL, &C., OF CERTAIN PLACES IN RELATION TO PETTENKOFER'S THEORY.

A summary of Professor Pettenkofer's views concerning the relation existing between existence of cholera and the condition of the ground-water 165

Dr. Buchanan's explanation of this theory 167

Various observations bearing more or less directly on the foregoing, in connection with short topographical descriptions of the following places, with special reference to their relation to water; in addition to which, the extent of the permeability of the soil, the percentage of organic matter in it, and the result of its microscopical examination in a moistened condition are given in detail. The method adopted in order to ascertain the exact extent to which the soil is porous to air and water will be found in connection with the first named station.

- Allahabad 168
- Cawnpore... 170
- Lucknow 171
- Fyzabad 173
- Agra 173
- Morar and Gwalior 174
- Meerut 176
- Peshawur 177

Concluding Remarks 178

INTRODUCTION.

IN accordance with instructions issued at the commencement of this inquiry, attention has been specially directed towards obtaining facts bearing on the truth or otherwise of two hypotheses regarding the cause of cholera—namely, the theory of its fungoid origin, particularly the one advanced by Professor Hallier of Jena; and the theory of the connection existing between cholera and certain conditions of the soil, promulgated by Professor Max von Pettenkofer of Munich.

In both theories the existence of a specific poison of an organised nature is maintained—a *germ;* and both savants believe it to exist in the alvine discharges of a person affected with cholera. The Munich Professor does not risk an opinion as to whether it belongs to the animal or to the vegetable kingdom, but infers that the soil is the *nidus* in which it grows; whereas Professor Hallier maintains that it multiplies in the human body, and unhesitatingly affirms it to be a fungus.

An account of the observations which have been made in order to test the views advanced by Professor Hallier will occupy the first portion of the report; and, as in the course of the investigation my attention has been directed to a consideration of the microscopic objects which are found in the evacuations of cholera patients, a description of them will at the same time be given; together with illustrations of various initiatory experiments bearing on the general question of 'disease-germs.'

⁂ *The illustrations are all drawn to scale with the aid of the* camera lucida, *and the magnifying power used is attached to each figure.*

The diameter of the object in any of the figures may readily be obtained by comparing them with the one-thousandth of an inch scale placed at the foot of each plate.

These plates have been engraved in the Office of the Surveyor General of India. They are very faithful copies of the original drawings, and will bear favorable comparison with the work of engravers in Europe, who are habitually engaged in this kind of employment. I am under great obligation to the Surveyor General and also to the Assistant Surveyor General, Captain W. G. Murray, under whose immediate superintendence the work has been done.

A REPORT

ON THE

MICROSCOPIC OBJECTS FOUND IN CHOLERA EVACUATIONS, &c.

PART I.

CONCERNING THE THEORY OF THE FUNGOID ORIGIN OF CHOLERA AND THE MICROSCOPIC OBJECTS FOUND IN CHOLERAIC EVACUATIONS.

THE theory of the fungoid origin of cholera is based upon the result of certain experiments instituted by Professor Hallier, with the view of ascertaining whether any special organisms could, by means of artificial cultivations, be obtained from choleraic discharges. These experiments have been repeated many times in Calcutta, but as the daily notes of each cultivation would occupy so much space, I propose giving a short summary of a few of the cultivations, illustrated by some of the *camera lucida* drawings which have been accumulated during the investigation. It may, however, previous to doing so, be well to state, in as few words as possible, what the theory really is. As the Professor has published the result of his labours, a short epitome of his *brochure*, weeded of as many technicalities as such a subject will permit; together with a selection of the leading figures in the plate, attached to the book, will, it is thought, best serve to convey his meaning.

Epitome of Hallier's cultivations, compiled from his treatise.*

Some choleraic discharges were sent to the Professor at Jena, obtained from a patient at Berlin during the epidemic of 1866, and another specimen from a patient at Elberfeld during the epidemic, in 1867. These were examined microscopically and found to contain:—

Discovery of cysts in cholera discharges, which seemed at first sight to present no organised structure.

1. *Cysts* of a yellow or brownish colour, which he for some time believed to be the fructification of *urocystis;* some of these had a very irregular outline, and at first sight seemed to possess no organic structure, caution being necessary not to confound them with masses of fat; application of pressure was, however, considered sufficient to discriminate between them. A drawing is given of some of these in a swelled, broken up condition (Fig. i, 1).

Other cysts more distinctly organised.

2. Here and there a few other cysts were seen, considered to be of the same kind as the foregoing; they were spherical or oval cysts varying considerably in size, enclosing a number of yellowish shining spores; these pores also varying in size, as may be seen by a reference to the accompanying figures (Fig. i, 2).

Spores of foregoing in swelled condition.

3. Groups of swollen gelatinous *spores* surrounded by finely molecular matter (Fig. i, 3). Others appear granular, and some show indication of fission.

which breaking down form "micrococcus."

4. *Micrococcus.*—The molecular matter just alluded to, supposed to have originated from the breaking up of the plasma in the "spore," a little heap often being observed, corresponding to the previously existing spore, called a "micro-

---

* "Das Cholera Contagium." Von Dr. Ernst Hallier. Leipzig, 1867.

Action of micrococcus on epithelium.

Development of micrococcus.

coccus colony" (Fig. i, 4*a*), which at *b* is still further broken up; at *c* a group of "colonies" is seen corresponding to the mass of spores previously contained in a cyst whose walls have disappeared. The minute protoplasmic molecules constituting these colonies were seen to adhere to various objects in the fluid, and especially to the particles of epithelium, in fact feeding upon them; this being invariably the way in which vegetable parasites first attack animal tissues. In the midst of these molecules larger ones were observed (Fig. i, 5), which have been figured in a still more advanced stage as torula-like formations at 6. This condition being, according to Professor Hallier, the transition stage to the development of the higher forms of fungi.

Cultivations instituted to prove organic connection between the foregoing.

A series of cultivations was carried out in order to prove that these bodies were organically related to each other, namely, that the irregularly defined cysts were advanced stages of the cyst with sharp contour and well marked spore contents; that the circular gelatinous-looking bodies were originally contained in capsules; that the capsules had been borne on a filament; that the filament had originated in a "micrococcus" cell; and that the "micrococcus" had been derived from the disintegration of these gelatinous spores. Portions of the discharges in question were isolated, and placed upon various substrata, beef, starch-paste, slices of lemon, &c., so as to supply the "micrococcus" with other nourishment than the epithelium of the intestinal canal, the disorganization of which substance is, according to Professor Hallier, the prime cause of cholera.

Result of the cultivations.

Germination of micrococcus.

Development of filaments with formation of macroconidia;

The results of these cultivations may be thus briefly described. During the first two or three days the micrococcus rapidly increased in amount, and developed into nucleated cells, which arranged themselves into chains, as already observed to exist to a slighter extent in the original evacuation. In some cases a thin pellicle formed (*mycoderma*), which, on being lifted, frequently broke down into round balls like the 'micrococcus colonies;' the torula cells about the fourth day were seen to germinate, the ends of the filaments having a linked appearance (6), which continuing to grow, presented the appearance usually seen in *oidium lactis*. In the course of a week the filaments assumed a branched and sacculated appearance (Fig. i, 7, 9), these saccules or joints (termed "macroconidia") being capable of germinating like the spores. The spores were on several

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EXPLANATION OF PLATE I.

A copy of Hallier's drawing of the cholera fungus.

	FIGS.	NOS.
Mature cholera "*cyst*," swollen and ruptured	i.	1
Cholera cysts less mature	"	2
Swelled "*spores*," which were supposed to have escaped from cholera cysts; some of them are seen degenerating into "*Micrococcus*"	"	3
"*Micrococcus Colonies*"—(*a*) Colony formed by the breaking up of a single spore. (*b*) Ditto still further broken up. (*c*) A group of "Colonies" corresponding to several spores. (*d*) Germinated *Micrococcus*	"	4
"*Micrococcus*" in process of germination	"	5
Ditto giving rise to filaments	"	6
Highly developed filament with cyst (*c*), and macroconidia (*m*)	"	7
A cholera cyst or *sporangium* still attached to its fertile filament	"	8
Filaments illustrating the tendency to the formation of *Tilletia caries*. What was considered a matured spore of the latter is marked *sp*	"	9
An aggregation of "cholera cysts"	"	10
A "cholera cyst" germinating	"	11

PLATE II.

The cholera bodies of Drs. Budd, Brittan, and Swayne (after *Robin*)	ii.
Brittan's "annular bodies" in cholera (copied from *Medical Gazette*)	iii.
Swayne's "cholera cells" (copied from *Lancet*)	iv.

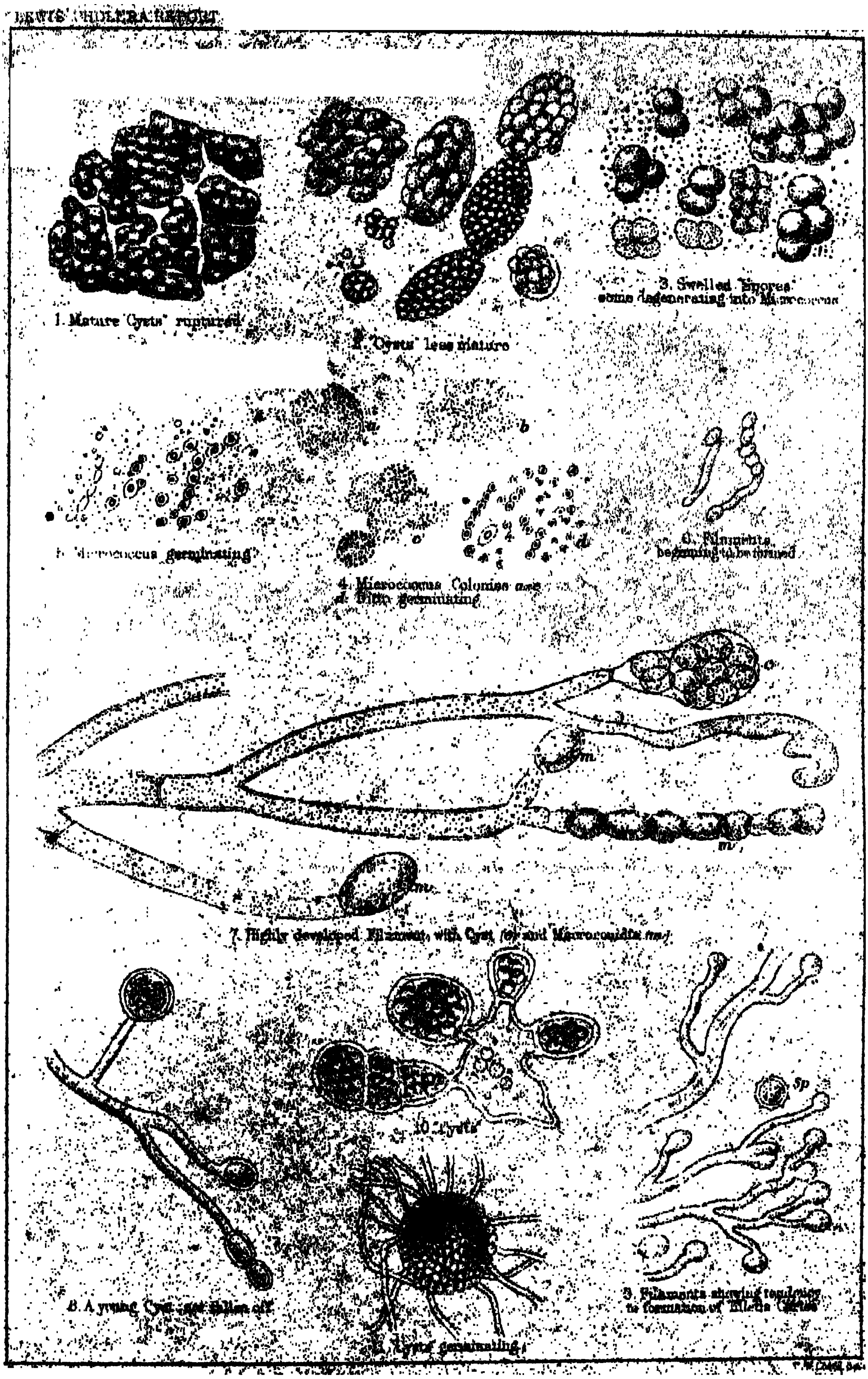
1. Mature 'Cysts' ruptured
2. 'Cysts' less mature
3. Swelled 'Spores' some degenerating into Micrococcus
5. Micrococcus germinating
4. Micrococcus Colonies a-c
d. Ditto germinating
b
d
6. Filaments beginning to be formed
c
m
m
m
7. Highly developed Filament with Cyst (c) and Macroconidia (m)
10. Cysts
sp
8. A young Cyst just fallen off
9. Filaments showing tendency to formation of Tilletia Cysts
11. Cysts germinating
T. W. Dodd, Sc.

FIG. I. HALLIER'S DRAWING OF THE "CHOLERA FUNGUS"

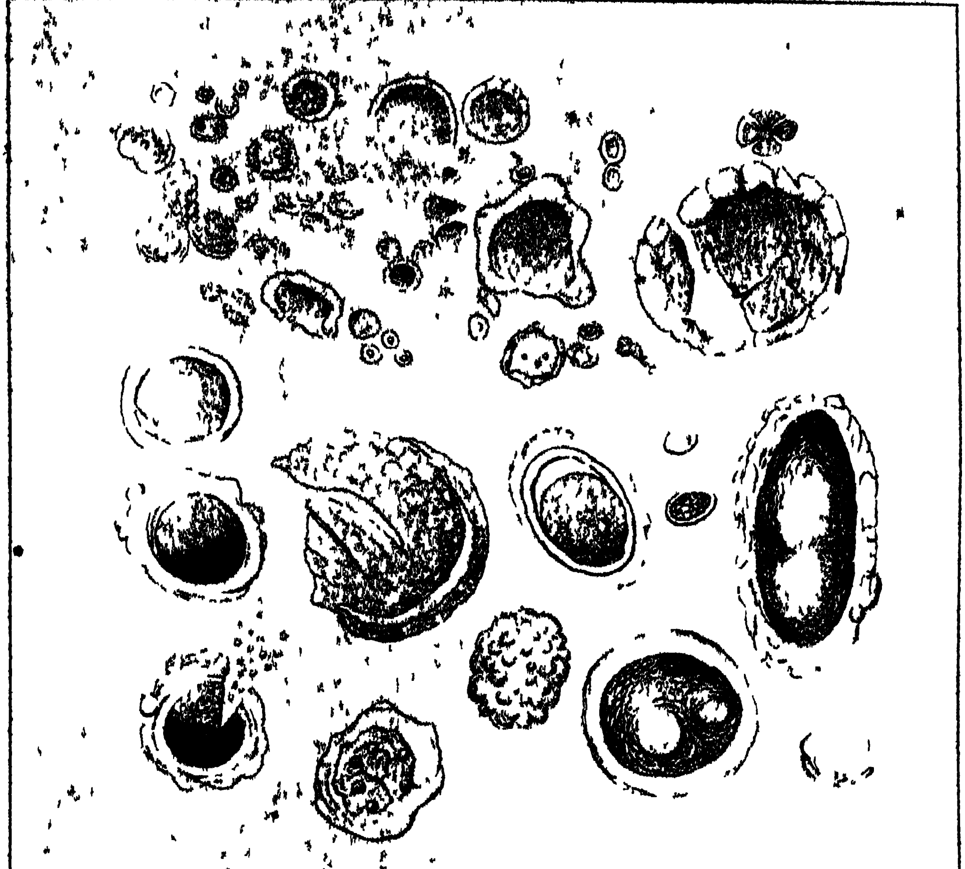

FIG II. CHOLERA BODIES of DRS BUDD, BRITTAN & SWAYNE (after ROBIN)

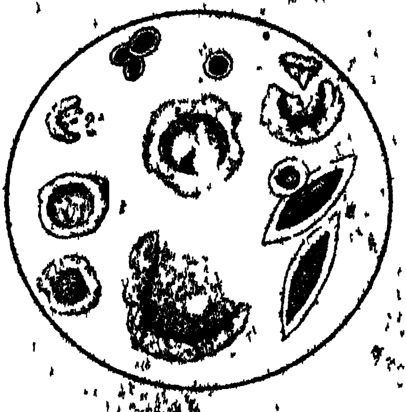

FIG III. DR BRITTAN'S "ANNULAR BODIES"
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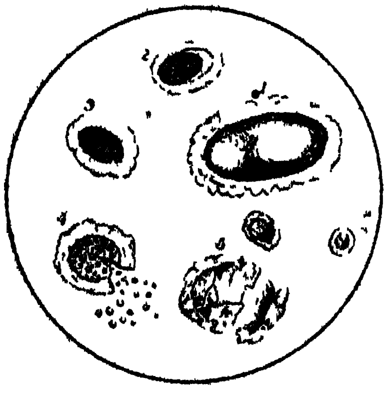

FIG IV DR SWAYNE'S BODIES
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FIGS. II - IV CHOLERA BODIES OF 1849

occasions seen to produce a peculiar form of fructification, considered by Dr. Hallier to be degenerated *Tilletia caries* (smut), (Fig. i, 9), and on one occasion a spore somewhat like that of smut was detected *(sp.)*; a few abortive attempts at the formation of spore-containing-cysts were also seen. In a few instances, however (about the 9th day), the filaments were observed to bear unmistakable cysts, some with the contained spores very evident (Fig. i, 8), and others in which this condition was less clear.

some of which simulated the fungus attacking wheat.

The extent of cyst development.

The nearest approach to the development of the cysts, corresponding to those in the discharges, which reminded the Professor so strongly of urocystis, is figured (Fig. i, 10), and the germination of the same at Fig. i, 11.

Importance attached by Professor Hallier to these cultivations.

Cysts obtained by inoculating growing-rice plants.

The inferences drawn by Dr. Hallier from these experiments in a few words are, that cholera is produced by a species of fungus belonging to the *ustilagines* or smut group. This fungus is a polycystis, similar to that attacking the rye only in Europe, but which the Professor believes attacks the rice plant in India; grounding this belief on the fact that, in the tissue of growing-rice plants watered with choleraic discharges, bodies were detected which he considered identical with the cysts found in the evacuations, thus accounting for the belief frequently expressed by the older writers, that cholera was generated by the consumption of rice in a diseased condition. The author has since modified his views as to the species of fungus in question, but retains the opinion that, whatever the fungus may be called, it closely corresponds with the fungus observed to develop in soil contaminated with choleraic discharges. It will now be seen that Professor Hallier believes that he has established an organic connection between the two kinds of "cysts," "spores" and "micrococcus."

The questions naturally arise—(1) Are there such bodies in the choleraic discharges examined in India? (2) What are they? and (3), are they found under similar circumstances elsewhere?

SECTION I.—"CYSTS."

The "Cholera Cysts" figured in M. Robin's work on "Vegetable Parasites" identified by Hallier.

History of these bodies.

Dr. Hallier appears to have derived the first idea of cholera cysts from the engravings of the "cholera bodies" of Drs. Swayne, Brittan, and Budd, in the year 1849, as reproduced in M. Robin's work on *Vegetable Parasites.** For, after stating that they are undoubtedly of the same nature, judging from the drawings of those seen by him, a severe reproof is administered to the French author for the summary way in which he disposed of the "cysts" of the Bristol Doctors. As these "cysts" have been the subject of discussion for more than twenty years, without any definite conclusion as to their real nature having been attained, a few observations concerning them may not be uninteresting. In September 1849, Dr. Brittan published a description of the bodies observed by him, termed "annular bodies," in the *London Medical Gazette;* this term comprising bodies varying considerably in size and appearance—large masses corresponding to Hallier's cyst, and smaller bodies which probably correspond to Hallier's spores. Mr. Brittan did not attempt any cultivation so as to connect the one class with the other, but inferred that they were the same in different stages of development, because he had observed something like a

---

* Histoire Naturelle des Vègètaux Parasites. Atlas, Pl. XII., Figs. 4-5.

Opinion of Mr. Busk as to the nature of these bodies ;

of Drs. Baly and Gull.

Of the Reverend M. J. Berkeley.

connection between the size with the severity and duration of the disease. The late Professor Quekett, of the Royal College of Surgeons, coincided with him in the belief that they were different stages of the same body, and of a fungoid nature. Mr. Swayne also announced that he had discovered certain cyst-like bodies which were named "cholera-cells," drawings and descriptions of which he published in the *Lancet* about the same time as Mr. Brittan. He also believed that the larger and smaller bodies figured were mere stages in the development of the same thing. Dr. Budd believed that he found similar bodies in the water of tainted districts, and designated them "cholera fungi." These announcements caused considerable excitement at the time, which was somewhat lessened when Mr. Busk announced that the bodies in the sample received by him were a species of uredo (*Uredo segetum*), the bunt of wheat, illustrating his statement by the removal of bodies like the ones in question from a loaf of ordinary brown bread. The College of Physicians appointed a Committee of Inquiry, and Drs. Baly and Gull drew up a report, in which the small bodies are said to be either carbonate of lime (probably from the aromatic confection mixture taken), disintegrated blood-cells, or starch particles; the larger ones figured by Dr. Budd to be probably accumulations of starch cells with disintegrated particles of vegetable tissue, and those of Drs. Brittan and Swayne to be some species of bunt, as identified by Mr. Busk. The Reverend M. J. Berkeley, the greatest authority on fungi we have, on being referred to, declared that the specimens he received were not fungi at all, so that evidently the propounders experienced some difficulty in recognizing their own "bodies," otherwise such microscopical experts as Mr. Berkeley and Mr. Busk would not have been supplied with such entirely different substances.

Reason for reproducing M. Robin's figures.

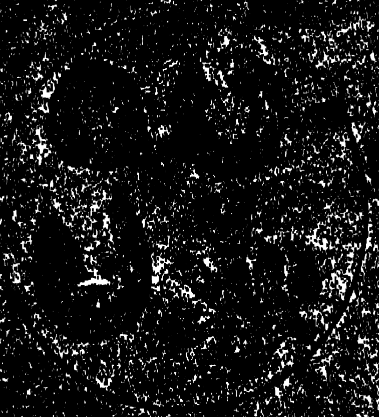
Here the matter rested until Professor Hallier observed a resemblance between the cysts in the choleraic discharges examined by him and those figures in M. Robin's book, which figures are here reproduced (Fig. ii), as being the only criterion we

EXPLANATION OF PLATE III.

	FIGS.	NOS
Cysts closely resembling Brittan's cholera bodies ; consisting principally of fatty matter enveloped by fibro-albuminous material ...	v.-vii.	
A globular cyst-like body observed in choleraic dejecta	v.	1
Effect of liq. potassæ upon No. 1	„	2-4
Two sizes of the globular cyst-like bodies as at v. 1	vi.	1-2
Appearance after the addition of acetic acid	„	3-5
Globular cyst-like body surrounded by a compact fibro-albuminous layer	vii.	1-2
Effect of ether after the previous application of liq. potassæ		3-4
Bodies resembling the "cholera cells" of Swayne. They are *ova* of ordinary Round-worms...	viii.-xi.	
Ova, as commonly met with in alvine discharges	viii.	1-4
Ova, the contents having assumed a somewhat defined arrangement		5-6
Embryo completed		7
Embryo escaped		8
Same as viii., the form having been altered by pressure		
Effect of adding ether	„	1
Aspect assumed after the addition of liq. potassæ subsequent to the application of ether ...	„	2-5
Same as viii.—Also treated with ether. No. 3 was ruptured by pressure	x.	1-5

PLATE IV.

More highly magnified specimen of Fig. viii	xi.	
After the addition of acetic acid	„	1-2
———————— of iodine and absolute alcohol	„	3
———————— of absolute alcohol only	„	4
Ova of *acarus* (*domesticus ?*)—sometimes found in choleraic and other dejections ...	xii.	
Partly disintegrated *acarus* obtained in a cholera stool (magnified by a low power) ...	xiii.	
Highly stained specimen of the *ovum* of *Tricocephalus* (*dispar ?*)—probably the body delineated at No. 2, Fig. iii, in Dr. Brittan's drawing	xiv.	1
Ditto ruptured by pressure	„	2
Highly stained specimen of the *ovum* of an *ascaris* found in the same stool (cholera) as the foregoing,—ruptured by pressure	„	3
Mycelium escaping from an aggregation of molecules (micrococcus). Spores not visible (cholera stool)	xv.	
Germinating spores, together with mycelial filaments (cholera stool)	xvi.	



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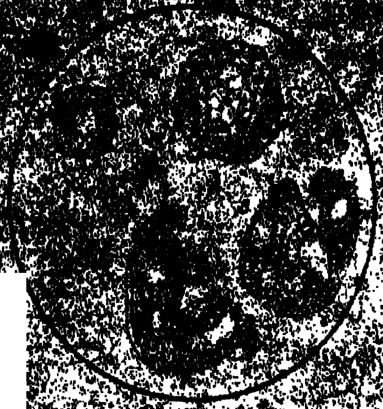
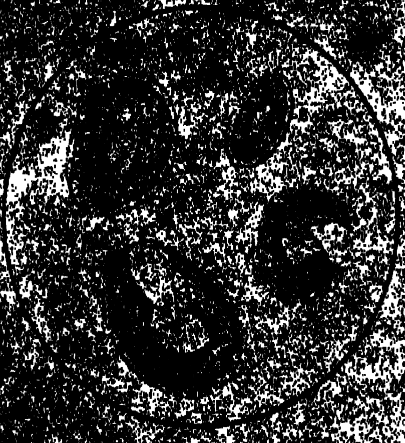


FIG. VI. ×250
1–2, Action of Acetic Acid
[illegible] 1–2. [illegible]



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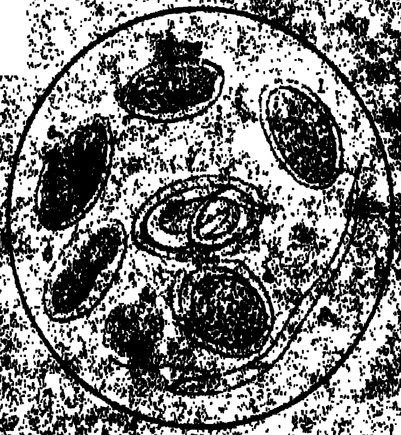
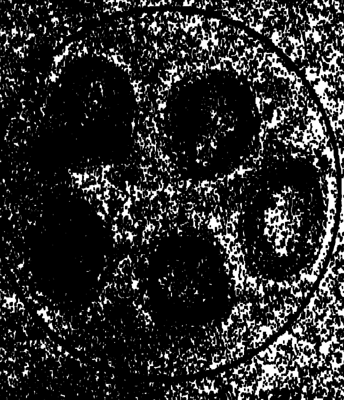


FIG. VIII. ×250
1–4, As commonly found. 5–6, A more advanced form assumed by Contents
7, Embryo completed. 8, Escaped embryo.
(Ova.)



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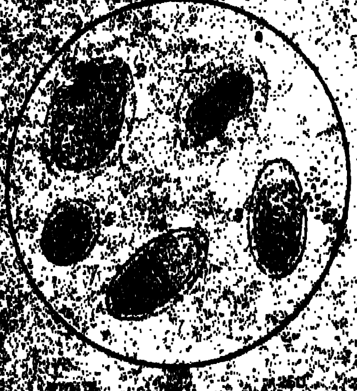
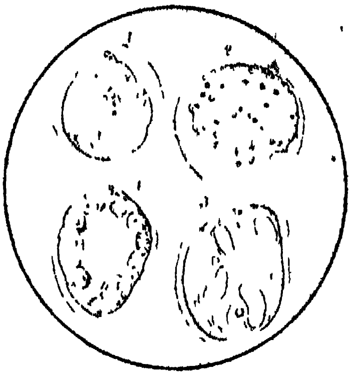


FIG. X. ×250
[illegible]
[illegible] of Action of [illegible] Ruptured
[illegible] (Ova.)

[illegible] IN CHOLERAIC DISCHARGES



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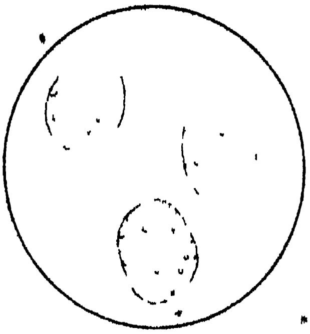

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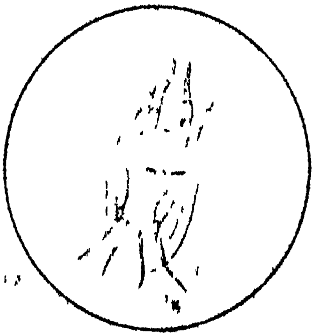
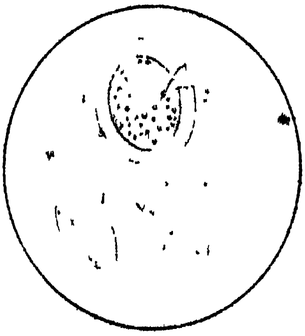


Fig. XIII [illegible] × 150
[illegible] Ascaris
from [illegible] cholera stool



[illegible] XIV [illegible]

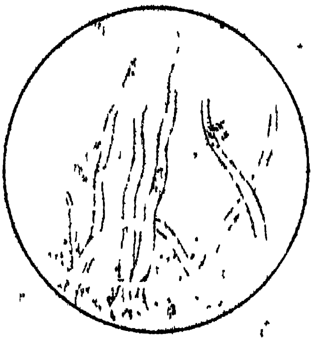
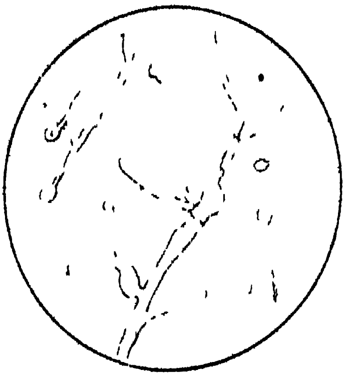


Fig. XV [illegible]
Mycelium [illegible]
[illegible] mucus [illegible]



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FIGS: XI XVI. OBTAINED IN CHOLERA-STOOL

possess of what Hallier really means when he speaks of cysts; the only drawing published by him of the mature cyst being that of a ruptured one (i, 1).

Cyst-like bodies in the choleraic dejecta observed in India.

In the examination of cholera dejecta which I have made in Calcutta and in the North-Western Provinces, many "cysts" were observed, and these in many cases closely resembled the ones figured in M. Robin's work, but were not of such universal occurrence as the attention they have obtained would have led one to expect; indeed, frequently absent altogether.

The "cysts" figured by Drs. Brittan and Swayne (the greater part of which are here reproduced from the drawings accompanying the original articles of these gentlemen) are certainly the kinds most frequently present in evacuations, as the fact that the following observations concerning them were completed before either the original figures or copies of them had been seen, would tend to show.

Two distinctly different kinds of "cysts" figured by Brittan and Swayne.

They may be divided into two classes. The principal figures in Dr. Brittan's drawing will serve as an illustration of one kind (Fig. iii, 1), and the leading figures in Dr. Swayne's of the other (Fig. iv, 1-4). As the two classes are copied in M. Robin's work, and Dr. Hallier does not intimate his belief that they are not of the same nature, it will perhaps be best to allude to the two, so as to leave no stone unturned in the matter. That they vary much in their nature will be manifest from the following observations:—

Irregular dark-yellow "cysts" corresponding to Brittan's "annular bodies."

Action of liquor potassæ;

of acetic acid;

of ether.

1. The dejecta of a patient who had been suffering from cholera about 12 hours, and who died on the second day, presented an enormous quantity of globular masses of a dark-yellow colour, except at the centre, where the colour was much lighter, and the mass was much more transparent than at the side (Fig. v, 1), which are not unlike those figured by Brittan. Strong liquor potassæ being added, one of the "cysts" burst, as at 2, and gradually broke up, as at 3, 4. The semi-fibro-gelatinous mass in which the "cysts" were involved was entirely dissolved. Another slide was taken, and two cysts selected, a large one and a smaller one (Fig. vi, 1, 2); strong acetic acid being added, no result followed for some time; pressure was applied, and the large one broke up into air-globules and granular matter (3, 4). Pressure was again applied, and the small one also broke up, as shown at 5. Another case may be quoted as illustrative of this kind of cyst. The evacuation was passed six hours after attack, and two hours before death; it contained numerous cyst-like bodies, some entire, others more or less broken up, and in many cases seemed to contain partitions (Fig. vii). These bodies withstood the action of rectified ether until the fibro-albuminous matter surrounding them had been removed by the application of potash.

Well defined, round or oval greenish-yellow cysts unaffected by ether and liquor potassæ, resembling Swayne's cholera-cells.

2. In the same evacuation other globular cyst-like bodies were found of a yellowish-green tint, having a more defined outline, and more evenly diffused contents (Fig. viii, 1, 4). These were unaffected by the ether, and remained unaffected by liquor potassæ for three days. These cysts occurred in nearly all the evacuations examined, but their precise nature was for a considerable time unexplained. They were sometimes round, but generally oval, and in some cases formed about a fourth of the entire sediment. This was particularly observed in some dejecta with which I was favoured from the Medical College Hospital, obtained from a native who was admitted with all the symptoms of cholera, but eventually recovered. They were, as in other cases, of a greenish-yellow tinge, with colourless hyaline capsules, for the most part oval (x)—sometimes round, and varying considerably in size, as seen in the figure. One of these cysts was selected for special observation, the one represented at Fig. ix, 1; ether

Action of re-agents repeated;

but no material change observed.

Result of pressure.

being added, the contents cleared up a little, but nothing further; this was followed by strong liquor potassæ, which caused it to become dotted and streaky, the yellow tinge, however, remaining (2); gradually changing to the appearance depicted at 3, the centre becoming more transparent than the circumference, which still further extended, as at 4. The transparency of the central portion diminished in the course of a few minutes (5), in which condition the object was left under the microscope until the next morning, when it was found to have retained its form, but had acquired a dark colour. Another cyst was selected with a dark-yellow granular centre, and hyaline capsule (Fig. x, 1). Ether was added; scarcely any change; merely clearing up the centre a little. It was then rolled over, and the granular contents spread throughout the entire cell (2). Firm pressure was applied, the eye being kept steadily at the microscope, when suddenly numerous minute molecules escaped (3), and the capsule became partly emptied of its contents (4). Liquor potassæ was added to a portion of the evacuation and allowed to stand all night. The cysts on examination next morning appeared unaffected.

Action of sulphuric acid, iodine, and alcohol.

To another test tube sulphuric acid was added. The cysts after remaining several hours in the acid were not much altered, but presented a globular outline with a hyaline capsule surrounding a greenish-yellow molecular mass (Fig. xi, 1, 2). On rolling them over they became oval, but soon regained the circular form. On the addition of a strong solution of iodine, the contents became dark-brown, and on subsequently adding absolute alcohol, fat-like globules made their appearance, which, by manipulation, could be made to move within the cell; the capsule being unaffected (Fig. xi, 3). Alcohol being added to another cyst without the iodine, the contents assumed a lumpy appearance with a clear space in the centre (Fig. xi, 4).

Embryos of worms associated with the cysts.

Contents of the cysts.

Several very small embryos of round-worms having been observed in the evacuation in active motion (Fig. viii, 8), diligent search was made as to their origin, which resulted in the explanation of the nature of the cysts also. The latter were frequently observed to give evidence of some kind of systematic arrangement of their contents, as shown in the figure (viii, 5, 6), and eventually a cyst was observed to contain something which rolled within it; this, after prolonged watching, was seen to present the exact form and size of the worm-like body just alluded to. It was coiled up on itself within the capsule (Fig. viii, 7), and continually altered its position. This corresponds almost accurately with the drawing of the ovum of *Ascaris mystax* in

EXPLANATION OF PLATE V.

	FIGS.	NOS.
Fungus developed in a cholera stool. A later condition observed in the preparation delineated at xv	xvii.	
Spores, some of which have germinated	„	1-2
Mycelium, upon which dilatations or macroconidia (*m*) are seen	„	3
Filaments with bulbous terminations	„	4
Fertile filament terminated by a cyst or *sporangium*, the contents of which is seen to have contracted within the capsule	„	5
The "Isolating Apparatus" used in some of the experiments	xviii.	
Funnel containing a plug of cotton wool	„	1
Flask containing strong sulphuric acid	„	2
Shallow dish (containing a solution of permanganate of potash), with an inverted bell-glass, inside of which is a small wire stage for elevating the preparation above the level of the fluid in the dish	„	3
An *Aspirator* filled with water. One arrow represents the escape of the latter, and the other arrow shows the course which the entering air has to take before it can replace the escaped water	„	4

PLATE VI.

Fungi which were developed in a cholera stool	xix.	
Fertile filament of *Aspergillus;* some of the spores (conidia) are seen falling off ...	xix.	1
Ditto ditto *Penicillium*	„	2
Cells of various sizes in the cultivation, probably modified spores	„	3
Very thin filaments terminating in excessively delicate mucor-like cysts or *sporangia*, some of which are filled with elongated spores	„	4

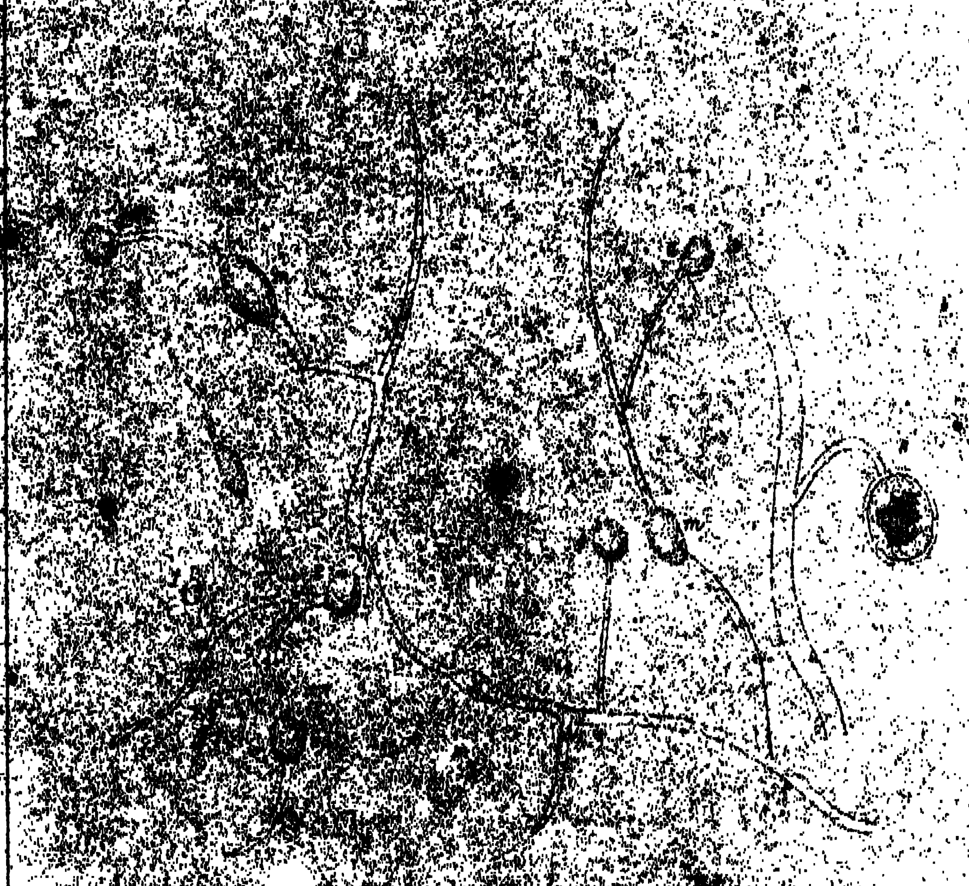


FIG. XVII. × 320

DEVELOPED IN A CHOLERA-STOOL

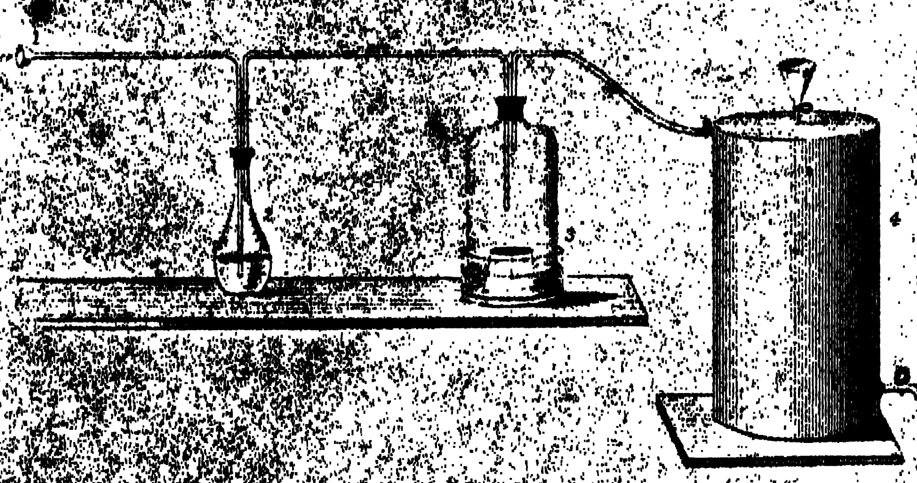


FIG. XVIII.

THE ISOLATING APPARATUS

C.W. [illegible] Sc.

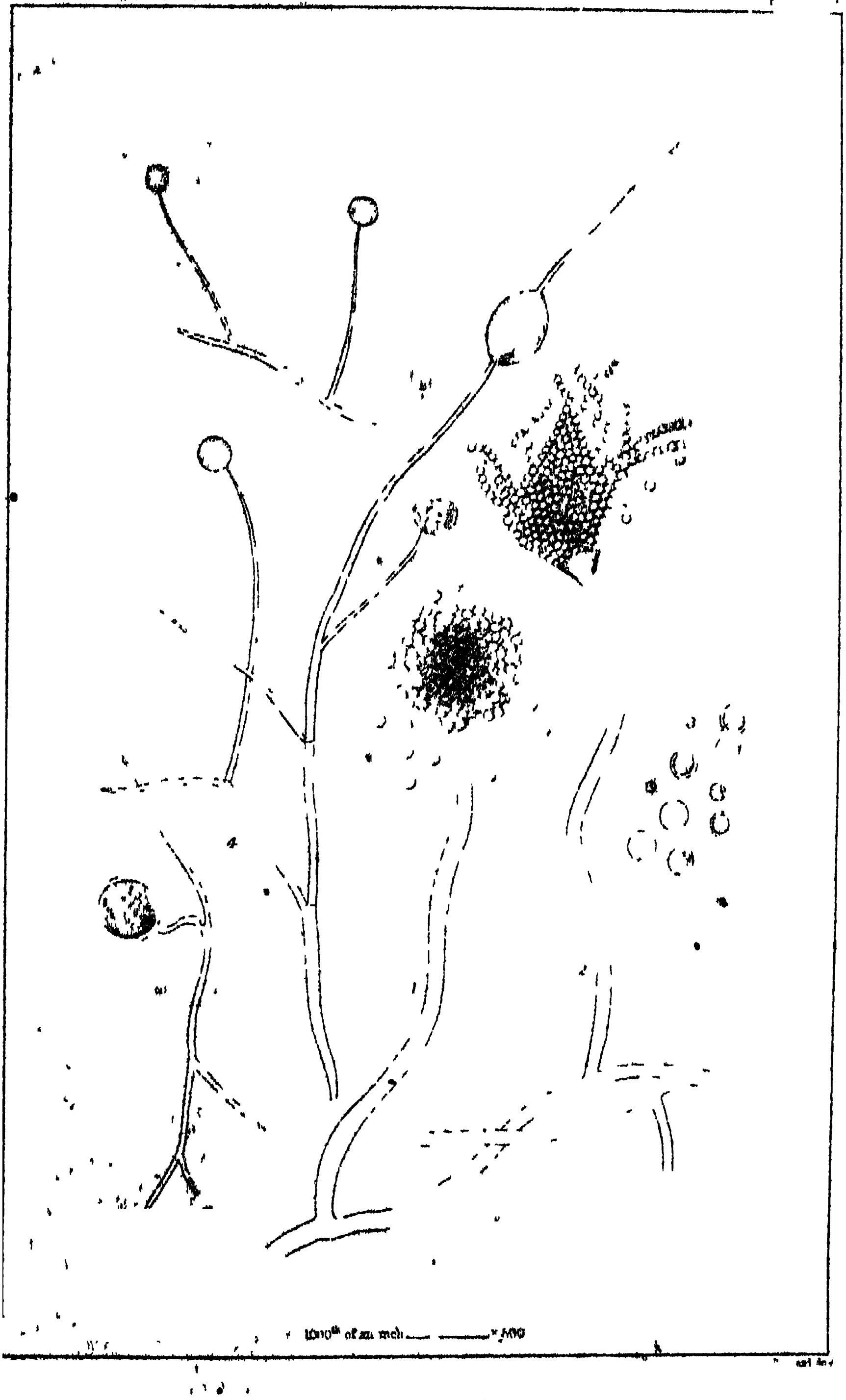


FIG. XIX FUNGI. DEVELOPED IN CHOLERA STOOL

Dr. Cobbold's work on Entozoa. It is, I think, pretty much the same as the cholera-cell of Mr. Swayne. In many cases the contents of these ova are also shrunken, occupying a part only of the enclosing membrane, as insisted on by this gentleman as a means of diagnosis. The effects of re-agents also, as above given, correspond very closely with the description given by him.

Acari, and their ova in cholera stools.

3. There is another cyst not very uncommon in choleraic dejecta, having a more delicate, but very resistent capsule (Fig. xii). Its nature may be inferred from the following statement: On two or three occasions, semi-disintegrated *acari* were observed in the stools examined, which had, in all probability, been swallowed with the food, in bread perhaps, and passed through the intestinal canal without being very much broken up, as may be seen from the figure (xiii). It did not, however, occur to me to connect the existence of the thin capsuled cysts with these *acari*, until one day two were seen rapidly depositing their eggs among some fungi under cultivation, which were being microscopically examined. These eggs corresponded precisely with the just described cysts.

Ova of another round-worm in Brittan's drawing.

4. Mr. Brittan figures some oblong bodies (Fig. iii, 2), which are not reproduced in M. Robin's plates, but were probably also considered to have some connection with cholera by the author of the article in the *Medical Gazette*. These are exceedingly common, and are accurately drawn in Fig. xiv, where one is seen entire, and another ruptured, together with one of Mr. Swayne's bodies in a ruptured condition; both required the application of considerable pressure before the capsule gave way. The first described elongated body is, I believe, the ovum of another round-worm, the *Tricocephalus (dispar ?)*. As to the cysts with distinct spore contents, which Hallier has figured (Fig. i) as being a mature condition of the cysts comparable to the drawings in Robin's work, I have not met with any which were unmistakably the same in fresh dejecta, but have developed them repeatedly; the particulars will be given further on. Other cyst-like bodies are occasionally found, but as they do not in any way correspond to those of the author of the theory under consideration, a description of them is reserved for another occasion; the principal ones, however, are those already described, namely, (1) *compound cysts*, consisting of fragments of various tissues and fat surrounded by a semi-organized fibro-albuminous layer, and (2) *ova* of various kinds, none of which are peculiar to cholera.

Summary of the principal cyst-like bodies observed in cholera.

As, however, the ultimate elements of other cysts than these might exist in the dejecta, every known method was resorted to for the purpose of developing them, a few illustrations of which I give in a condensed form.

Illustration I:—

Small portions of the dejecta which contained such numbers of the cysts, alluded to in page 133 and represented at Fig. v, were placed in three perfectly clean watch-glasses with the following substances:—

I.—Cholera evacuation 3 drachms, and 2 drops of acetic acid, so as to neutralize it.

II.—Cholera evacuation 3 drachms, phosphate of ammonia 3 grains, grape-sugar 3 grains.

III.—Distilled water 3 drachms, phosphate of ammonia 3 grains, grape-sugar 3 grains.

To receive these, a small wire stand had been placed in a shallow dish containing a strong solution of permanganate of potash, and the stand and watch-glasses covered in by a bell-glass (carefully cleaned, and subsequently rinsed with alcohol) which stood in the fluid. This was set aside in an average temperature of 82° *Fahr.*

Progress of the cultivation.

On the third day small white specks were seen on the surface of No. I, which had returned to its alkaline condition, one of which was picked out as rapidly as possible from beneath the bell-glass and placed on the stage of the microscope. It consisted

One cyst developed.

After the seventh day aspergillus appeared in all.

of an aggregation of minute molecules held together by a slimy substance, from which filaments of fungi escaped (Fig. xv). Thus matters stood until the fifth day, when specks were observed in the other two preparations. A speck from No. II being picked out, presented numerous spores (Fig. xvii, 1), many of them germinating very actively (2), and the filaments here and there were swollen out into macroconidia ($3m$), some of these dilatations being transparent, others granular; frequently the filaments were seen to terminate in a bulb (4), and in one case a filament was tipped by a cyst in which the contents were granular and had contracted from the capsules (5). Precisely similar filaments and dilatations were found in No. I, but a distinct cyst (or sporangium) could not be seen. This condition lasted until the seventh day, when the mycelium gradually degenerated, and a crop of aspergillus appeared on all three, of various colours, but principally of the dark varieties.

Illustration II:—

Growing solution.

A portion of the fluid contents of the small intestine from a patient who had died within six hours of attack was carefully transferred to a vial, and allowed to settle for an hour. In the meantime a "growing" solution was made, consisting of grape-sugar 3 grains, phosphate of ammonia 10 grains, glycerine 1 drachm, and distilled water 1 ounce. A drop of this was placed on three glass slides; to these were added:—

No. I.—A minute quantity of the upper layer of intestinal contents.

No. II.—A minute quantity of the sediment chiefly.

No. III.—A minute quantity of diabetic urine containing "yeast cells."

Spores germinating in each preparation on the third day.

Only penicillium and aspergillus appeared.

These were placed as before under a bell-glass placed in Condy's fluid; on the third day specks appeared on the preparation in each slide, which proved to be due to spores and mycelium (Fig. xvi), the three slides presenting similar appearances under the microscope. On the fourth day No. I presented an excellent forest of penicillium, and No. II a similar crop of aspergillus, of the black and purple coloured variety, while No. III produced both penicillium and aspergillus. These were systematically examined for eight days, no other fungus making its appearance. The aspergillus crop in No. II presented tufts of different colours; specks were observed in the other two preparations; specks of yellow and brownish-purple being the most abundant.

Isolating apparatus described.

To experiments conducted in this manner, there is the serious objection that each time the preparation is examined, no matter how carefully, the possibility exists of foreign matter getting into the preparation. With the intention of obviating this source of fallacy as much as possible, an aspirator was employed to supply the preparation with purified air, at least as pure as passing it through concentrated sulphuric acid will allow. By referring to the accompanying sketch, it will be readily seen how this was effected (Fig. xviii). A small funnel (1) with a pledget of clean cotton wool inserted into its neck was attached to a piece of bent glass-tubing; this tubing passed through a perforation in the cork of a flask (2) containing concentrated sulphuric acid; from the neck of

---

EXPLANATION OF PLATE VII.

	FIGS.	NOS.
Highly developed specimens of mycelial filaments, with numerous dilatations (*Macroconidia*), which separating are found as free circular cells in the field, capable of germinating like ordinary spores (cultivated in cholera discharge)	xx.	

PLATE VIII.

Fungi developed in ordinary evacuation.

	FIGS.	NOS.
	„	
Spores in process of germination	xvi.	1-2
Micrococcus	..	3
Penicillium glaucum	xxii.	1
Aspergillus	..	2
Numerous filaments of *Oidium lactis*, corresponding to the "cholera-fungus" of Thomé ...	xxiii.	

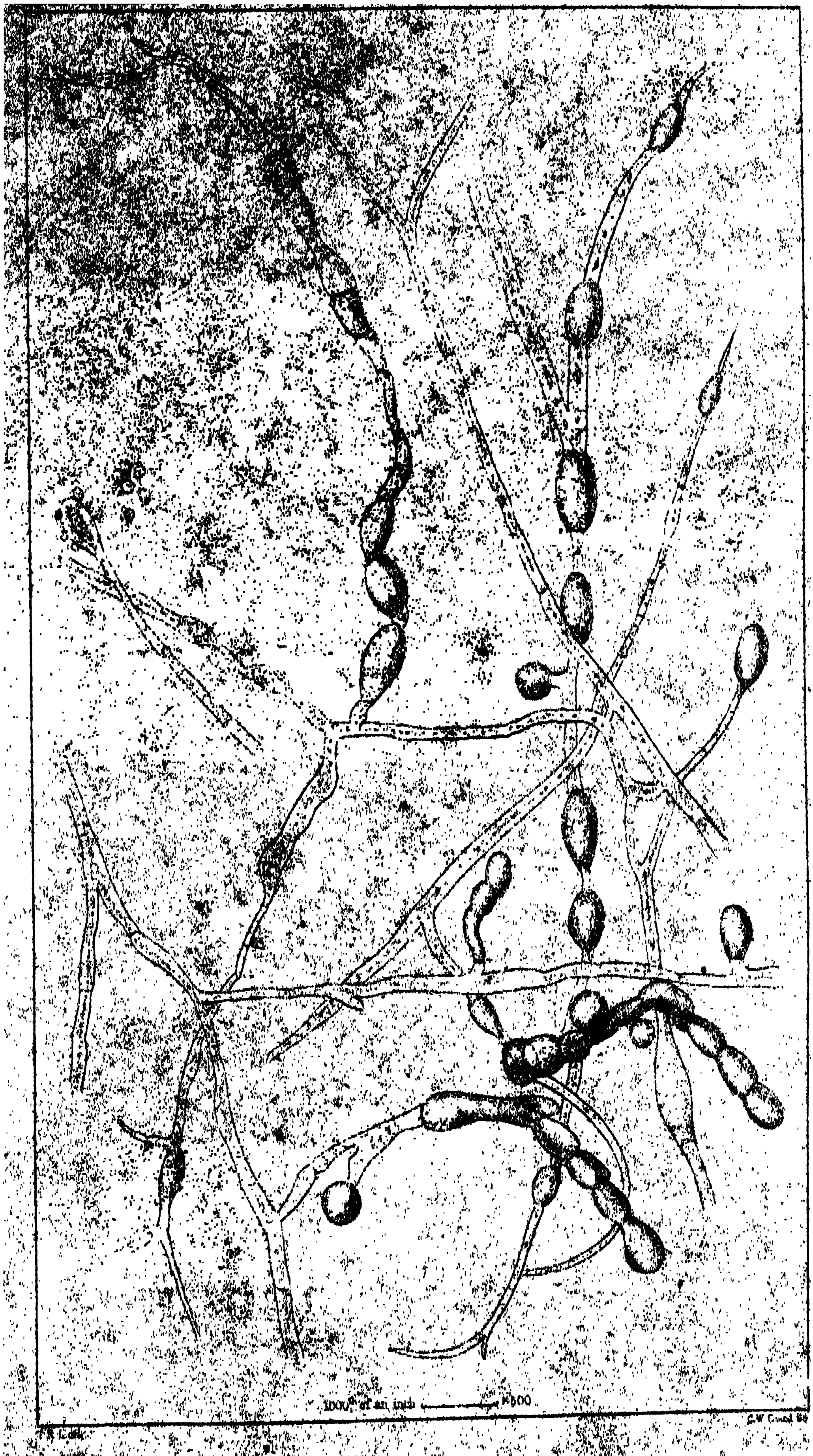


FIG. XX. MYCELIUM WITH MACROCONIDIA BUT WITHOUT SPORANGIA DEVELOPED IN CHOLERAIC DISCHARGE.

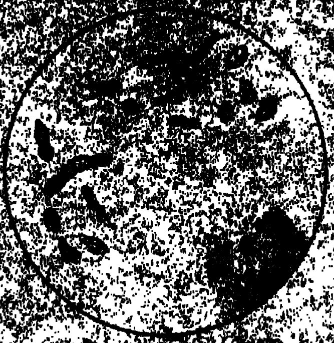


FIG. XX.

[illegible]

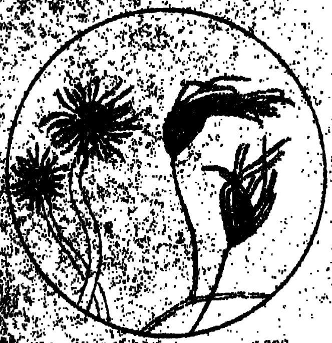
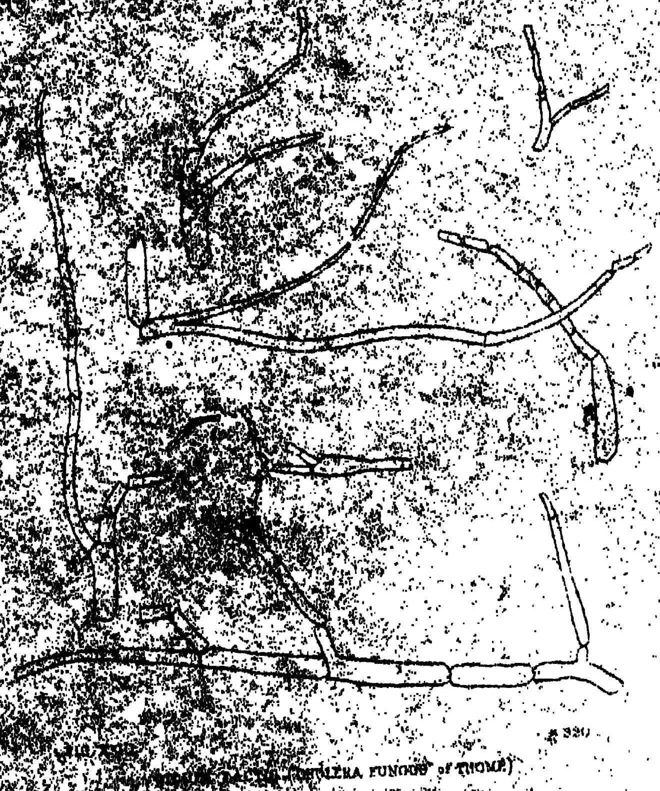


FIG. XXI. × 320

1. Penicillium
2. Aspergillus



× 320

FIG. XXII.

[illegible] (CHOLERA FUNGUS of THOMÉ)

C.W.[illegible]

FIGS. XX.-XXII. DEVELOPED IN ORDINARY EXCRETA

× 320

this flask another piece of glass-tubing emerged which connected it with a perforated bell-glass, standing in a shallow dish containing Condy's fluid; (3) another piece of tubing connected this with the aspirator (4) filled with water. All the connections were carefully luted, so that the only air which could have got at the preparation on the stand within the bell-glass (of course *minus* the air which previously existed therein) must have passed through the sulphuric acid.

Illustration III:—

A perfectly fresh choleraic evacuation having been obtained two hours before death (in a rapidly fatal case lasting only seven hours), three watch-glasses were placed in the isolating apparatus with the following ingredients:—

Substances placed in the isolating apparatus

No. I.—A slice of the interior of a plantain weighing quarter of an ounce was scooped out, and six drops of the sediment from the evacuation was placed in the little cavity thus made.

No. II.—A few drops of the evacuation-sediment only.

No. III.—A slice of the same plantain as in No. I.

The apparatus had been made as clean as possible previous to this, rinsed out with spirit immediately before depositing these glasses on the stand beneath the bell-glass, and the greatest care taken to avoid foreign matter getting at the preparations before placing them there. The air within was renewed morning and evening; the weather was warm the whole time, the average day temperature of the room being about 90° *Fahr.*

allowed to remain in the apparatus for three weeks.

On the fourth day a mould was seen to appear on the two slices of fruit, quite as marked on the clean plantain as on the other, but no change was visible in the watch-glass containing the evacuation only. This condition lasted a fortnight, the crop of fungus gradually increasing in the two former, and no change could be observed in the latter. During the third week the fungus not having made any progress, and the liquid in the watch-glass No. II becoming rather less from evaporation, the apparatus was opened on the twenty-fourth day, and the result carefully examined forthwith.

Condition of the fruit on removal.

The two pieces of fruit were covered with a thick coating of a black and yellow coloured fungus, both colours appearing in the two preparations; the yellow prevailing in the tainted slice, and the black on the other; the difference being merely in the proportion, for tufts of each colour appeared here and there over the surface. These were found under the microscope to be *aspergillus* (Fig. xix, 1) and *penicillium* (xix, 2). Precisely the same fungus and the same species grew on glycerine, on starch-paste, and on pieces of dirty cork in various parts of the room. In the other watch-glass, however, containing the evacuation only, a very different appearance was observed. The preparation had become partly dry, and presented a filmy appearance. On placing the watch-glass on the stage of the microscope, a great quantity of spherical bodies were seen with granular contents, the average size being about that of a white blood-corpuscle, but the size varied considerably, among which long delicate mycelical filaments ramified (Fig. xix, 3); from this network thin fertile threads arose, tipped in most instances with exceedingly delicate vesicles (xix, 4), which appearance at first was taken for the dew-drop aspect so common to mycelium; others were seen of a much larger size. On watching them closely, all the bodies were seen to roll round and round like a *volvox.* Elongated (spore-like) bodies were distinctly visible within each delicate capsule, unless very small (xix, 5), and seemed to move irrespective of the capsule (or sporangium): of this, however, I am not certain. They appeared white by reflected light, and yellowish-green by transmitted light. The movement appeared to me to be due to currents of air in the room, each little sphere twirling round rapidly in one direction for ten or twenty turns, then as

The fungus developed in the watch-glass with evacuation only.

Description of the delicate cysts.

rapidly twirling in the opposite way. The course of the spinning vesicle was not always horizontal, but varied until it was nearly vertical to the filament on which it was perched, but never quite vertical. It seemed analogous to the spinning of a plate or ball nicely pivoted on a juggler's stick, which may be seen to revolve in every direction but the vertical, the analogy being complete, except that the organic connection between the sporangium and the stalk rendered reverse turns necessary. On touching this with water, the capsule appeared to become instantaneously dissolved, no trace being left: the spores had fallen down, and the filament looked perfectly bare. Some parts of the mycelium were dilated into saccules (or macroconidia) (Fig. xix, 6), but no evidence of spore contents was distinguishable.

Illustration IV:—

Cultivation of a cholera stool obtained during an epidemic of the disease.

Being desirous of ascertaining whether from the rice-water stools in epidemic cholera I could produce capsules more unmistakably like those figured by Professor Hallier than I had succeeded in doing from discharges obtained in an endemic locality, such as Calcutta is, a sample was brought from Lucknow, carefully secured in a clean vial, which was obtained during my visit to the North-Western Provinces during the epidemic of cholera which occurred there in September last. A drachm of the sediment was poured into a perfectly clean watch-glass, and placed on the stage in the isolating apparatus in the manner described in the last illustration. In the course of a week a film was seen to have formed, which continued to increase in density for another week, but no trace of any mould could be observed in it through the bell-glass. At the end of three weeks the preparation was taken out and microscopically examined, but no cysts had formed, as in the former preparation treated in exactly the same way, but there was a great quantity of mycelium, in the meshes of which numerous circular bodies were embedded (Fig. xx); the latter seemed to be the result of segmentation of the former, judging from the similarity between the free cells and the imperfectly detached mycelium. The watch-glass was replaced in the apparatus for a fortnight, but no change took place.

No cysts were developed, but a quantity of segmented mycelium.

From these illustrations it will be seen that whereas cysts, distinctly resembling those described by Professor Hallier, may, by *cultivation*, be observed to develop in choleraic discharges, yet they are by no means constantly obtainable, for out of more than a hundred cultivations, made with the express object of developing these cysts, only three times was I able to produce any fungi bearing such tokens of fructification.

Is it possible to develop fungi in other than cholera dejections bearing fruit resembling the "cholera cyst?" The answer must be "Yes," as the following experiment will show :—

EXPLANATION OF PLATE IX.

Fungi developed in ordinary evacuation.	FIGS.	NOS.
Spores, cysts, and filaments of *Mucor* in various stages of development	xxiv.	
Escaped spores	„	1
Detached cyst or sporangium	„	2
Cysts still attached to the fertile filaments	„	3
Heads of fertile filaments (Columella), with the remains of the ruptured cyst-capsules still attached	„	4
N. B.—Compare Nos. 2 and 3 with Hallier's figures (Plate I, Nos. 2 and 8).		
Ruptured *mucor* sporangia	xxv.	
A ruptured cyst with spores escaping	„	1
Ditto the spores having completely escaped	„	2
Ditto detached from its stalk	„	3
A *mucor* cyst detached from the fertile filament. The spores are seen to escape through the capsule	xxvi.	1
Aspergillus fructification simulating that of *mucor;* a glutinous film surrounding it, thus keeping the spores or *conidia* together. The fertile filament is seen to be partly ruptured	„	2
Detached *Aspergillus* heads of various sizes, the spores being held together by means of some glutinous material	xxvii.	1-2
Ditto in process of germination. *N. B.*—Compare with Hallier's drawing of the mature cholera-cyst in the same condition (Plate 1, No. 11.)...	„	3

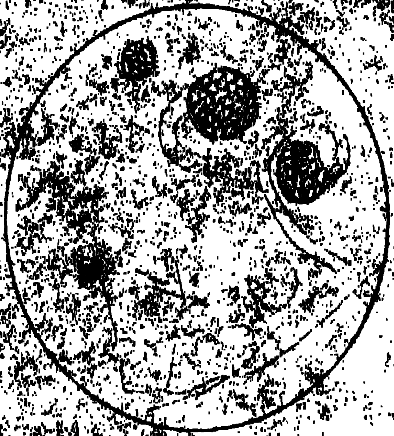


FIG. XXIV. ×320

([illegible] in a dry condition)

1. Spores escaped from Sporangium
2. Cyst detached
3. Cysts attached to the fertile filament
4. Fertile filament with remains of Cyst attached

(Mucor)

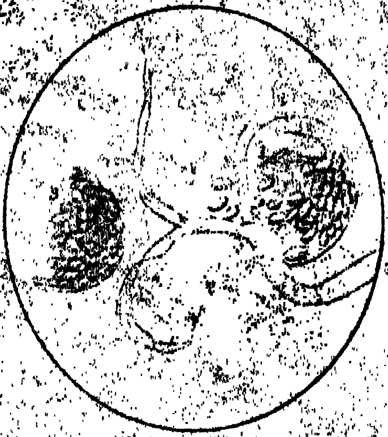


FIG. XXV. ×320

(Moistened with water)

1. Ruptured Cyst with Spores escaping
2. — ditto — Spores escaped
3. — ditto — detached from Stalk

(Mucor)

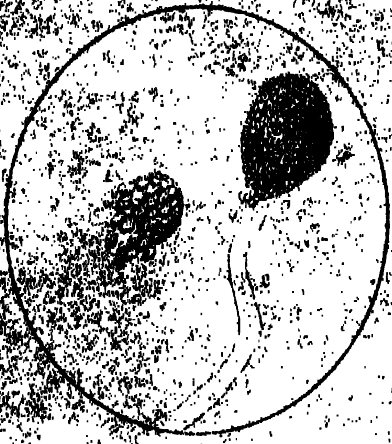


FIG. XXVI. ×320

(Moistened with water)

1. Sporangium with Spores escaping

(Mucor)

2. Aspergillus-head surrounded by a gelatinous film, simulating a Capsule

(Aspergillus)

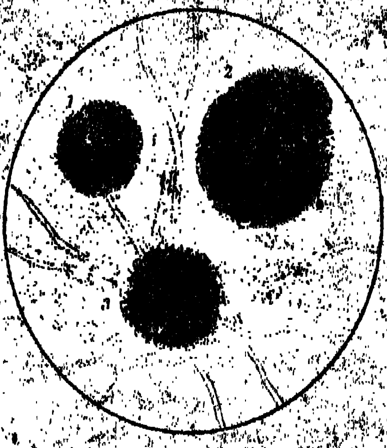


FIG. XXVII. ×320

(Moistened)

1.2. Same as XXVI. 2.
3. ditto germinating

(Aspergillus)

1000th of an inch ×320

CYSTS &c. SIMULATING HALLIERS CHOLERA FUNGUS DEVELOPED IN ORDINARY EVACUATION.

Illustration V:—

Cultivations of ordinary healthy stool, one isolated and the other exposed.

Progress of exposed preparation.

About half an ounce of fæces, obtained from a perfectly healthy person, was placed on a small glass plate, and carefully transferred into the bell-glass of the isolating apparatus in connection with the aspirator, as already described, the greatest possible care having been taken to prevent foreign matter coming into contact with it before depositing it on the stage in the apparatus. A small portion of the same substance was placed on a glass slide, without any special precautionary measures being taken to prevent access of foreign matter, so as to be able to examine it from day to day for comparison with the preparation in the bell-glass, which it was not intended to disturb. On the second day a few small white spots were observed on both preparations, one of which was picked out with a needle from the non-isolated mass, and placed on the stage of the microscope. It consisted entirely of minute molecules, round and elongated (Fig. xxi, 1), embedded in a white shining substance (2), in connection with which were circular and oval cells of a greenish tint (3); frequently two or more were seen strung together (4); clear spaces were seen in them all nearly.

The "cholera fungus" of Thomé.

On the fourth day the mass in the apparatus was completely coated by this white humus, except that some of the earlier observed spots had acquired a yellowish-brown colour. The exposed slide presented a somewhat similar appearance. The cells had become nearly everywhere strung together, and long filaments of *oidium lactis* (Fig. xxiii), corresponding exactly to the figures given by Thomé of the cholera fungus discovered by him, to which rather a long name was given at the time, *viz.*, "*Cylindrotænium Choleræ Asiaticæ.*"

Condition of the preparation under bell-glass after first week.

The apparatus opened on the twenty-first day.

Cysts obtained exactly like the "cholera-cysts" figured by Hallier.

This condition lasted till the sixth day, when a crop of a white mould was perceptible in the isolated preparation, and a plentiful crop of *penicillium* and *aspergillus* appeared on the other cultivation (Fig. xxii). This slide having become rather dry, a few drops of distilled water were after this occasionally added. On the eighth day long delicate filaments were seen growing out of the white humus-looking substance in the apparatus, and on the tenth day other filaments were observed, which seemed to be tipped with various coloured heads, apparently of the same kind as on the other slide, those of a bluish and yellowish brown tint prevailing; but by the eighteenth day the long delicate filaments had grown over them, the white surface of the preparation presenting a woolly appearance. After this on further change could be seen to take place in either cultivation, and on the twenty-first day of the experiment the bell-glass was opened, and the glass plate placed on the stage of the microscope. Precisely the same species of *aspergillus* and *penicillium* were found as existed in the non-isolated cultivations, with the addition that great numbers of the filaments forming the white flocculent tuft bore at their terminations cysts or sporangia filled with distinct spores (Fig. xxiv, 1-4), which, I think, correspond exactly to the cysts figured by Professor Hallier of the immature cholera-cysts, whose drawing has already been given and may be compared with this.*

A germinating aspergillus tuft simulating a "cholera-cyst" in the same condition.

Aspergillus tufts were present in great numbers: nearly all of them had fallen off from their filaments among the mycelium; a few, however, were perfect, consequently easily recognised. Some of these fallen masses were germinating (Fig. xxvii, 2), and presented, as nearly as anything possibly could, the appearance of the mass of spores figured by Professor Hallier as a "cholera-cyst" in process of germination (Fig. i, 11).

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* I have obtained excellent examples of this fungus *(Mucor)* on the intestinal mucous membrane of the pig also, whilst subjecting strips of the intestine to continuous observation.

As the preparation was dry, a few of the cysts were transferred to another slide and water added, upon which many of the capsules of the sporangia gradually ruptured, and the spores escaped (Fig. xxv), a bare columella and the ruin of the capsule alone remaining.

The cysts and spores sown on a slide, and the development described step by step.

As it was not advisable to expose the preparation during the experiment, the various stages in the development of these cysts were not followed, in order to ascertain which some spores and cysts were sown on the juice of various fruits, boiled and unboiled, and on pieces of cheese. They rapidly germinated, and in those preparations which were sown in cells on the slide without a covering glass, produced precisely similar cysts to those sown; when, however, covering glasses were used, the fructification was not so perfect. For example, a glass slide was taken, and two semi-circles of asphalt varnish were brushed on it, one being rather larger than the other, so that the ends of one half-circle might overlap the other, but not so closely as not to permit the entrance and exit of air, as may be learnt from the Figure (xxix). When nearly dry, a minute quantity of growing fluid, consisting of a solution of grape-sugar and phosphate of ammonia, was placed in the centre, upon which a few spores were sown, a thin covering glass being placed over it, which adhered to the semi-dried varnish. The slide was placed under a bell-glass, kept damp by being lined with some moist blotting-paper, at an average temperature of 90° *Fahr.*

In the course of six hours a clear oil-like spot appeared in the spores, and on the second day they were germinating rapidly (Fig. xxviii, 1). On the third day the field was crowded with mycelial filaments (Fig. xxviii, 2), and on the seventh day a filament which had crept beyond the *droplet* of fluid into the free space between it and the varnish bore a distinct sporangium (Fig. xxviii, 3). Separate spores, however, were not distinguishable in this cyst.

Deductions.

These illustrations will, I think, be sufficient evidence to show—(1) that the cholera-cysts figured by Professor Hallier are not always obtainable from choleraic discharges, (2) not confined to cholera, (3) nor even to diseased conditions of the intestine, but (4) may be cultivated from the stool of perfectly healthy persons.

Inoculability of rice plants.

The experiments instituted to test the observation as to the inoculability of rice plants have as yet not been satisfactory, consequently no conclusions have been arrived at on the matter.

EXPLANATION OF PLATE X.

Fungus developed in ordinary stool (mucor).

	FIGS.	NOS.
Appearance of the Mycelium on the second and third day	xxviii.	1·2
A fertile filament which crept out of the preparation, and which bore a distinct cyst on the seventh day. Defined spores could not be distinguished among the contents ...	„	3
Growing-cell, in which is seen the position of the preparation through the thin covering-glass. Between this glass and the subjacent glass-slide the fungus (xxviii) above described was cultivated. The varying diameter of the segments of the circles enclosing the preparation permits the entrance of air	xxix.	

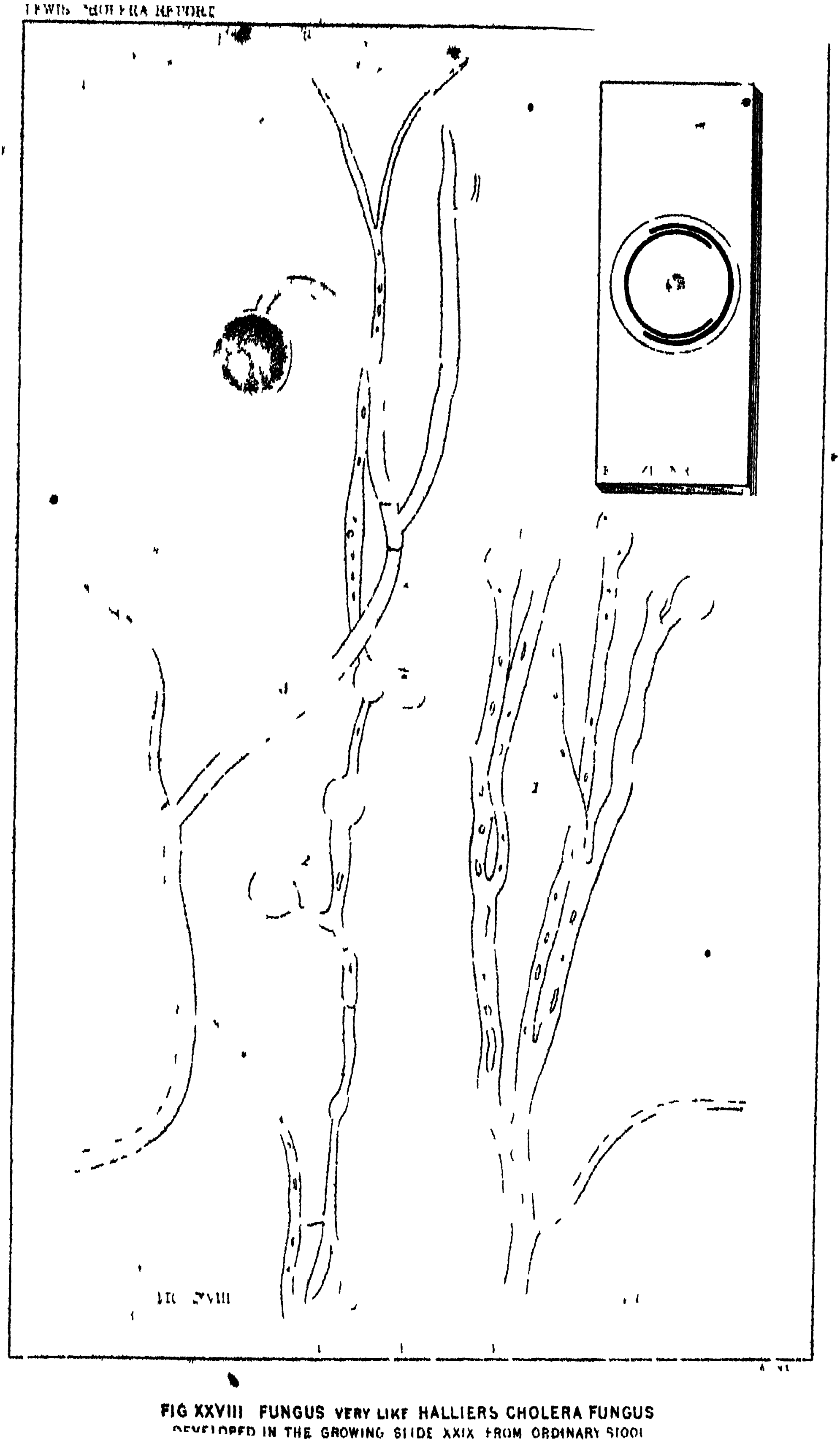


FIG XXVIII FUNGUS VERY LIKE HALLIERS CHOLERA FUNGUS DEVELOPED IN THE GROWING SLIDE XXIX FROM ORDINARY STOOL

SECTION II.—"SPORES."

Corpuscles simulating the drawing given of "spores" by Hallier.

It is by no means so easy to explain what the yellowish more or less oval hyaline bodies are which Professor Hallier calls "spores" (*vide* Fig. i, 3); such bodies are exceedingly common in choleraic discharges, and I believe are very different in their nature; but whether any of them are "spores" will, I think, be satisfactorily explained in the sequel. The objects I have met with in cholera discharges more or less resembling these bodies may be arranged into four classes:—

(**1**).—*Globules of a fatty nature ;*

(**2**).—*Altered blood-cells ;*

(**3**).—*Corpuscles imbedded in the tenacious substance composing the "flakes ;" and,*

(**4**).—*Globular conditions of certain infusoria.*

The frequent difficulty of recognising globules of a fatty nature from other globules.

1. Persons accustomed to microscopic work must have found that to distinguish fat or oil globules from other bodies very different in their nature, is not always so easy a matter as is commonly stated in text books on the subject. It has frequently occurred during this investigation that in spite of the addition of heat, absolute alcohol, rectified ether, potash, iodine, and other re-agents, not overlooking the prolonged application of carmine, I have failed in distinguishing with certainty fat globules from pellets of slimy substances endowed with life, when both were known to be present. Indeed, I have frequently mixed fat with gum water and other substances for the purpose of testing the value of the re-agents which had been applied to bodies under examination, and have found that, in a great number of instances, the results are fallacious; either the globules remain unaltered, or both kinds are destroyed, or they are acted upon indiscriminately. A fair sample of this difficulty is carefully delineated at Figure xxx, representing objects very like delicate "cysts" and "spores," which being watched for eight hours remained unaltered, resisting pressure, &c., but broke down in twenty-four hours into unmistakable globules of oil.

Having experienced very great difficulty in this matter, I propose giving one more example of a condition which is a particularly prominent feature in the early stools of a cholera patient; indeed, for a long time I was unable to persuade myself that it was not a condition of some low form of life, especially when the globules were highly coloured, or when the homogeneous contents of the pellicle shifted its position.

Various forms assumed by globules of a fatty nature.

A sailor was admitted into hospital with all the symptoms of cholera, and, at the time this evacuation was obtained, suffered from severe cramps. The stool was examined three minutes after being voided, was found to be alkaline and of a muddy colour. The sediment consisted almost entirely of greenish-yellow corpuscles, varying considerably in size, the larger ones being flattened out under the covering glass (Fig. xxxi); many of these having the contents contracted, the contour of a delicate, filmy capsule being evident at the spot where shrinking seemed to have taken place (Fig. xxxii). They were generally spherical (1), but many were oval (2), and a few were seen presenting several hyaline projections whilst rolling in the fluid on the slide (3). In some cases they retained their form and appearance for a long time, but the greater number lasted only for a few hours. They were frequently observed to vanish suddenly like a distended blood-cell, leaving only a ring behind (Fig. xxxiii, 1), previous to which, in a few instances, a slightly granular appearance was presented (2), and the ring was often seen particularly granular (3, 4, 5), as if all the contained granules had adhered to it. The globule in the centre of the figure, with the contents separated from its enclosing pellicle (6), was watched for a long time, but no alteration in its appearance occurred. Other similar bodies were watched continuously for three hours with the same result, save that they gradually became excessively transparent, visible only by careful adjustment of the mirror. In the course of four or five hours the entire field presented the appearance delineated in the figure last alluded to. At Figure xxxiv a regular colony is seen of these globules surrounding a crystal. They also disappeared in the course of a few hours.

Effect of re-agents.

Rectified ether caused the pellicle to present a minute granular appearance, and those which had the contents puckered became symmetrical. Boiling in ether seemed to thicken the pellicle. A portion of this was set aside until the next day, and was found to have retained its condition, whereas the globules in the evacuation set aside in the vial had disappeared.

Absolute alcohol subsequently added to the boiled portion seemed rather to diminish their number. In some cases one globule was observed to "melt" into the other, so as to form one globule; otherwise no change was observable.

Solution of chloride of zinc and iodine,—some became shrunken and irregular, others continued spherical, but with a finely granular pellicle.

Solution of iodine only caused several of them to become very transparent—scarcely visible, were it not for the slight tint communicated to them.

Liquor potassæ causes them to lose their yellow colour; they become perfectly transparent, except that a few molecules which existed within are brought to view. A few of the globules withstand the re-agent for some time.

Acetic acid seemed to coagulate the pellicle, as it became finely granular: very much the same appearance as followed the addition of alcohol.

Dilute sulphuric acid caused the contents to contract, but the colour was retained, or it became slightly brown.

Dilute nitric and hydrochloric acids acted in the same way.

Their artificial production.

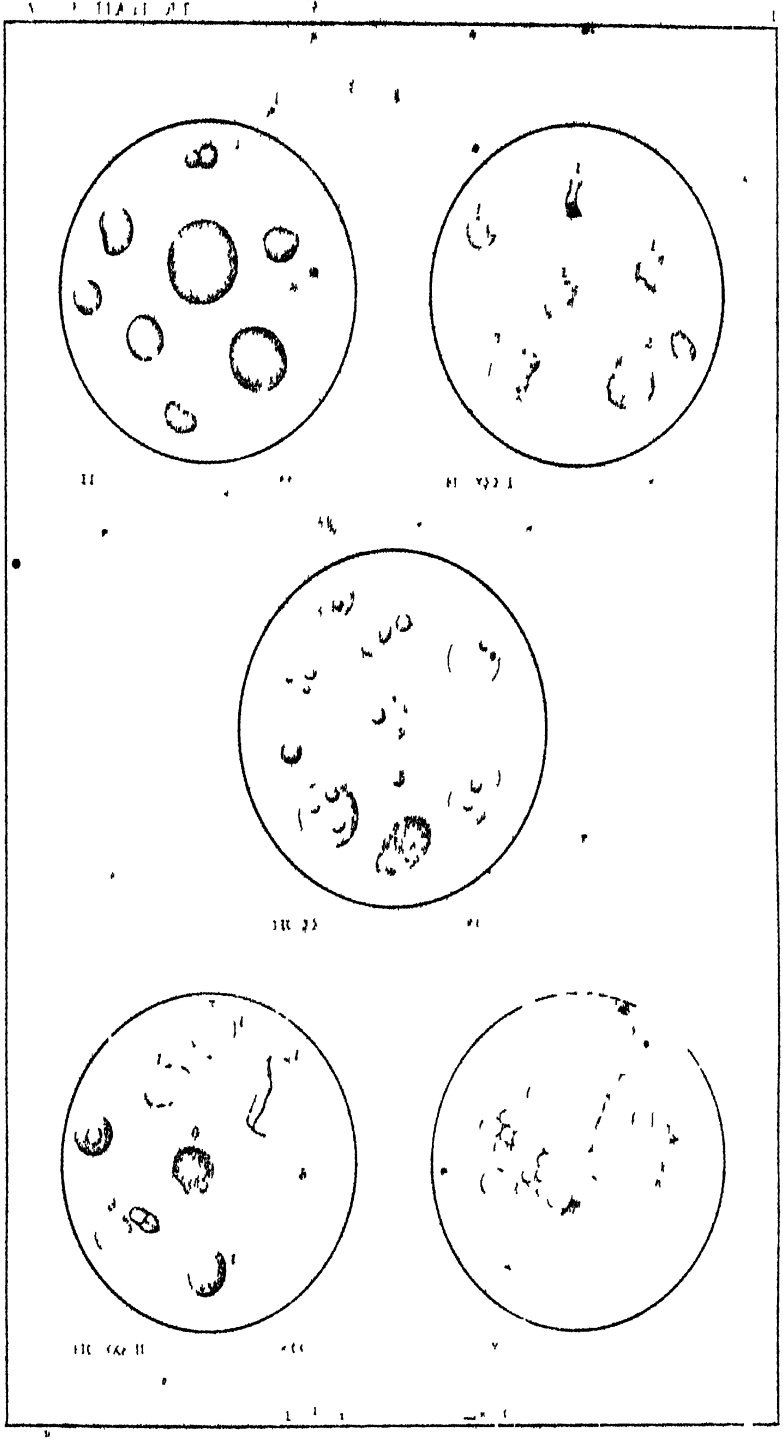
I have made many attempts artificially to produce globules of this kind, the nearest approach being a mixture of melted butter, albumen, and gum water well shaken together, and at the time of examination adding a little thick syrup so as to cause the puckering to take place between the pellicle and the contained fat. The action of re-agents, however, on this pellicle, was slightly different to the foregoing.

Distension of spores by fluid.

Spores immersed in fluids of varying density become greatly altered in their appearance; frequently the outer layer becomes so attenuated, and perhaps stained, that it is a matter of great difficulty to state positively that the cell pellicle surrounding the protoplasm of a spore differs from the clearly defined outline of a globule of oil, in spite of a knowledge of the action of re-agents, and of the varying powers of refraction which liquids manifest. Hence it is not impossible, nor inexcusable, that Professor Hallier in some instances might have been deceived by these appearances, especially as it is evident from the conclusions he draws concerning the importance of some of the "cysts" in M. Robin's plate (which are undoubtedly fat), that he had not made prolonged microscopic examinations of ordinary excreta: the Professor, however, had more spore-like

EXPLANATION OF PLATE XI.

	FIGS.	NOS.
Globules of a fatty nature simulating "cysts," "spores," &c.	xxx.	
Greenish-yellow globules which formed a considerable portion of the sediment of a cholera stool	xxxi.	
Spherical form of ditto; the tinged portion is seen to be contracted from the delicate pellicle which encloses it...	xxxii.	1
Oval and irregular shape of ditto	"	2-3
Appearance presented by the foregoing in the course of four hours	xxxiii.	
Vanished suddenly, a pale "ring" only remaining	"	1
Granular appearance which occasionally preceded this condition	"	2
Granular appearance of ring-like remains	"	3–5
Spherical body with a dense, tinged substance (oil) centrally situated	"	6
An aggregation of the foregoing globules surrounding a phosphatic crystal	xxxiv.	



FIGS XXX XXXIV GLOBULES OF A FATTY NATURE
SIMULATING CYSTS SPORES &c

objects to deal with than fat, such as the ones described in the next and following paragraphs.

Altered blood-corpuscles.

2. Almost invariably circular cells are observed in choleraic dejections of a greenish-yellow or brownish tint; contents generally homogeneous, and the capsules very delicate.

The exact microscopic appearance of one of these.

The microscopic appearance of one of these capsules is here represented at different distances from the object-glass, the size selected being about the average (Fig. xxxv). The appearance of the capsule a little before the focus is attained is shown at 1, a clear spot shading off into a dark ring. On bringing the object-glass nearer to it, the defined outline of a spherical body is seen with slight opacity in the centre (2); and on attaining the exact focus, a greenish-yellow perfectly hyaline sphere is brought to view (3). On going beyond this, a dark spot is seen in the centre, gradually shading off towards the periphery (4); when the light is shut off almost entirely, a slightly irregular space is seen presenting a very slight pink tint (5); this particular cell was constantly watched for three hours, when suddenly it became transparent, and required most careful illumination and focusing to make it visible, a delicate ring of a slightly diminished diameter being all that remained (6).

One or more vesicle-like protrusions.

These, however, are not always spherical; frequently a very filmy tongue-like projection is observed (Fig. xxxvi, 1), sometimes more than one (2); it is projected exceedingly slowly, and then retracted amœba-like. After a time this action ceases, the projected vesicle-like tongue is either permanently retracted, or is left out rolling about with the corpuscle in the fluid (3). These are doubtless distended blood-cells, a great number of which may exist without yielding the slightest trace of colour to a rice-water evacuation.

Precisely similar appearances observed in a case of "*Chylous urine.*"

Gelatinisation of the urine.

Appearance of coagulum.

Whilst following the changes taking place in these particular corpuscles in various fluids, I had opportunities of making an examination of the urine of a patient in the General Hospital under the care of Dr. Lyons, who had been suffering from the condition known as "*Chylous urine*" for about a month, together with pain in the right testicle, and great emaciation, in spite of good food and a good appetite. As the colour so closely resembled many rice-water stools, I carefully examined it, and was repaid in a way I had not anticipated. It was albuminous to the extent of about one-fourth of its bulk, slightly acid, with a specific gravity of 1·015; ether caused a separation into two layers, a clear urine-like fluid containing oil molecules, and a white homogeneous mass consisting of minutely molecular *débris*. Before the addition of re-agents the fluid under the microscope so closely resembled the condition of a cholera stool just described, as not to be distinguishable from it; yellowish-green cells, some hyaline, some granular, some protruding a tongue-like prominence, and others with the contained plasma puckered in various ways (Fig. xxxvii). A few of the larger corpuscles were seen to shift themselves (like an amœba) a distance fully their own diameter, the shape altering at the same time. At first I doubted that they really were blood-cells, as the extent of variation in size was considerable, as shown by reference to the figure, which is carefully drawn to scale. The fluid very quickly gelatinised in the test tube; indeed it frequently does so in the patient's bladder, giving rise to stoppages during micturition. I have not seen cholera discharges spontaneously gelatinise, although such a condition is said to occur. A portion of the coagulated mass (which when stirred closely resembled a lump of moist gluten) was teased on a slide with needles and examined. It consisted of fibrillæ studded with blood; granular cells, scarcely differing from those seen in cholera discharge flakes, except, perhaps, in being more universally granular. They seemed to present more of the character of pus-cells.

In the midst of this fibro-albuminous matter several *embryos of a round-worm* were discovered every time the urine was examined, one of which is seen

The embryos of a round-worm detected.

coiled up in the drawing (Fig. xxxviii). A careful sketch of a larger one, after the addition of acetic acid, is given at Figure xxxix. In the course of a few minutes, when the sketch was nearly completed, a *caudal-bursa* became visible under the influence of the acid, and is delineated at No. 2.

Approximation of diameter.

When first seen, I thought they were some detached filaments of a fungus, judging from the hyaline, structureless appearance presented; after a time, however, a few of them were observed to move very slowly, when all doubt as to their nature was at an end. It will not be surprising that the existence of these was not suspected, when we consider that fully two hundred of the larger size figured could pass abreast through a very small pin-hole, an orifice not exceeding the fiftieth of an inch in diameter, as may be verified by a simple calculation.

Perhaps this fact may help to throw some light on a very obscure disease, of which little is known beyond the symptoms, although frequently met with in some parts of the world; and, indeed, may perhaps account for its localisation to such places as the West Coast of Africa, where I am told it is by no means a rare malady.

As the mature worm still retains a hold on its victim, being perhaps safely lodged in the kidney, and not having seen an embryo of this kind before, nor yet a drawing, I must leave to a more experienced helminthologist to decide to what species of nematode it belongs.*

The corpuscles associated with the "flakes" change in appearance very quickly.

3. In examination of this class of corpuscle, namely, those intimately associated with the well-known flakes in cholera dejections, it is of the greatest importance that the evacuation should be a recent one, because its character may be entirely changed in the course of an hour or two. Sometimes, however, the change is not so rapid, depending on the chemical nature of the fluid, especially on the extent of its alkalinity—cholera stools being almost invariably alkaline. The method adopted in these examinations is to pour the discharge into a conical vessel, set it aside for a short time, and, when the sediment is seen to have been deposited, a pipette is introduced in order to transfer a portion of it to the slide. Frequently the sediment is seen to be of a very slimy nature, requiring some tact in bringing it into the pipette.

Illustration I:—

Case exemplifying these corpuscles in an early condition.

The evacuation was from a man suffering for eight hours from a severe form of cholera, who died on the second day. It was of a pale straw colour, with a muco-flocculent deposit. In the upper liquid portion nothing special was visible, but on examination of the sediment, it was found to consist of flakes of a gelatinous semi-fibrous texture, studded with globules, circular and oval, with a pale yellow tint, and of a homogeneous nature, a very correct representation of which is given at Figure xl. In some of these bodies a clear space is observed, but nothing further could be made of their nature.

EXPLANATION OF PLATE XII.

	FIGS.	NOS.
Microscopic appearance of a distended blood-cell at various distances from the object-glass ...	xxxv.	1-5
Aspect presented by the blood-cell at the end of three hours ...	„	6
Blood-cells from a cholera stool	xxxvi.	
Presenting a single hyaline protrusion, capable of being retracted	„	1
Presenting two retractile protrusions	„	2
The protruded portion after a time is frequently not retracted, but is seen to trail with the cell when the covering-glass is shifted, as long as the cell is visible	„	3
Blood-cells similar to the foregoing (xxxvi) observed in "Chylous" urine	xxxvii.	
Some of the aspects presented by these cells	„	1-5
Various forms assumed by one of the larger corpuscles present	„	6
Embryo of a Round-worm imbedded in a mass of gelatinised substance which formed in "Chylous" urine	xxxviii.	
Embryo (of a larger size than that delineated at xxxviii), after the addition of acetic acid. The hook-like appearance is only evident in certain positions	xxxix.	1
The *caudal-bursa* which became evident after prolonged action of the acid	„	2

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* While this report was passing through the press, the "*chylous*" condition which this urine had presented for more than two months gradually disappeared, and so did all traces of albumen, and of the embryo-worms.

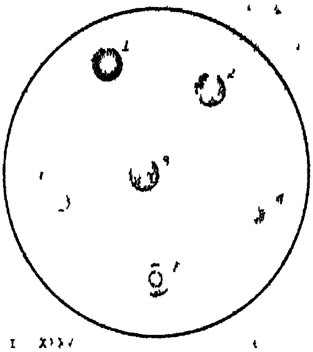


FIG. XXXV.

[illegible]

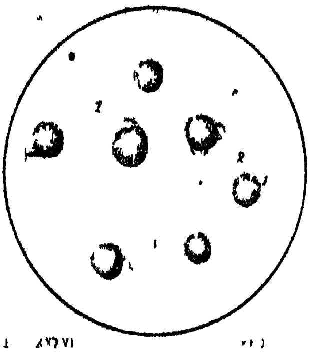


FIG. XXXVI.

[illegible]

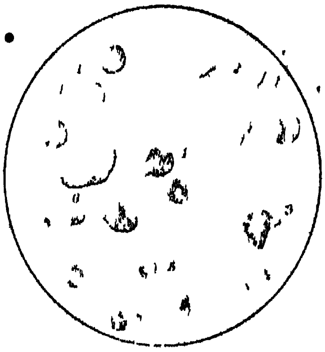


FIG. XXXVII.

[illegible]

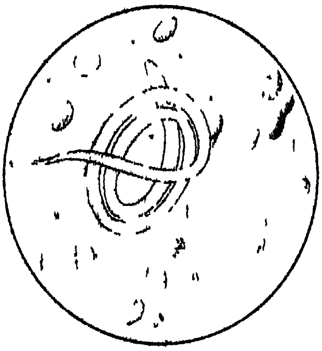


FIG. XXXVIII.

[illegible]

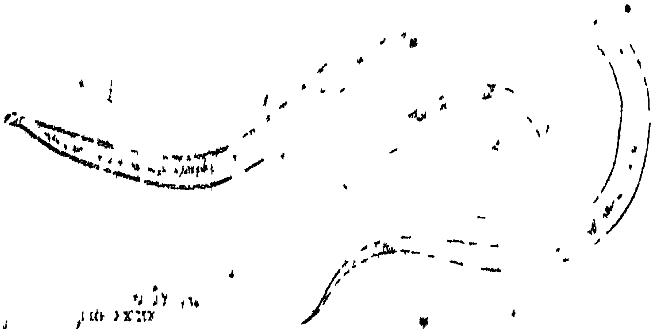


FIG. XXXIX.

[illegible]

FIGS XXXV - XXXIX

[illegible]

Iodine stained some of a brownish-red, and others of a deep yellow.

Effect of re-agents.

Liquor potassæ seemed to make the corpuscles more distinct at first, and to isolate the contained granules and molecules, giving the contents a distinctly dotted appearance. The fibrillated substance became slightly granular, then it gradually faded, and so did the corpuscles, which in the course of half an hour entirely disappeared, except here and there a little cluster of molecules, five or six, with a clear space in the centre, all trace of the fibrillated texture having disappeared.

Acetic acid increases the stringy appearance at first, making each little fibril appear dotted, like a very fine bead of granules, or minute molecules; eventually the fibrillated appearance is obliterated altogether, a diffused, finely granular substance being universal. The corpuscles maintain a sharply defined outline; the continuity of the outline, however, seems frequently somewhat broken in one or two places, as if the circle were formed of two or three short vibriones imperfectly united at their ends. The next day the sediment was still slimy, and could not be taken up by means of a delicately pointed pipette. It still consisted of a streaky, semi-membranaceous substance, but the imbedded cells had either become transparent, or presented a granular or minutely molecular appearance (Fig. xli), with no distinct cell wall. Solution of chloride of gold picked them out very distinctly.

The appearance on the second

and succeeding days.

On the third day the flakes had lost their membranaceous character altogether, but many of the granular corpuscles remained. On the fourth day a few animalculæ were seen, which enormously increased by the fifth (Fig. xlii). On three occasions only have I observed the appearance of *this* protozoon in choleraic discharges.

Several evacuations from the same patient were subsequently examined; the flakes, however, did not present the fat globule-like appearance again, but molecular, as shown in the previous Figure (xli).

Illustration II:—

Case in which the corpuscles were granular when the evacuation was voided, and exhibited amœboid movements.

Another case, the third liquid stool presented a yellow colour, about one-sixth of which was composed of a whitish flocculent sediment, presenting precisely the same microscopical character as the second stage of the last described; a semi-membranaceous substance, dotted with irregularly defined cells (Fig. xliii), very like what is seen in exudations effused in catarrh. On very careful watching they are seen to protrude excessively delicate processes of an amœboid character (Fig. xliv), just as the white blood-corpuscles do.

Effect of re-agents.

Liquor potassæ caused the membranaceous appearance to vanish after a time, reducing the cells to an aggregation of granular or molecular particles. *Ether* does not destroy them, nor does *acetic acid*, but it seemed to make manifest a delicate cell wall; and *iodine* superadded enhanced this appearance, in many cases causing the contents to collect at one part of the cell (Fig. xlv).

The membranaceous appearance had disappeared in the fluid on the fourth day, but the granular cells remained visible for nearly a week.

Illustration III:—

Case in which hyaline and granular bodies are seen together.

The fifth evacuation of a patient suffering from the cold stage of cholera was examined half an hour after it was passed. It was colourless, with a few shreddy flocculi floating in it. It was slightly alkaline. The flakes presented the same membranaceous appearance as in the foregoing example (Fig. xliii), with numerous corpuscles, more or less intimately held in the meshes of this texture, a great number, however, being dispersed in the fluid; some were oil-like and some granular, examples of both kinds being spherical and oval, and the gradations from the merest particle of slimy or oily matter to the complete corpuscle were so fine, that it was impossible to point out any salient distinguishing character about them. When free, the hyaline and granular corpuscles were more or less round, but when contained in the meshes of this fibrillated texture, were generally elongated, as shown in the drawing (Fig. xlvi).

Effect of iodine.

Iodine solution being added to the slide, it was observed that whereas some of them were coloured brownish-red, the greater portion became merely stained by the ordinary tint of the iodine (Fig. xlvii); all, however, in the course of the day becoming granular, but the distinction of brown-red and mere yellow remained.

In the course of an hour other slides were prepared, but the microscopic appearance had become totally different. The oil-like bodies, of whatever shape, had become granular, and the field presented exactly the same appearance as presented in Figures xli and xliii, while the addition of re-agents produced the same results. On the fourth day all traces of corpuscles had passed away, merely broken down molecular matter remaining.

The "still" circular condition of animalculæ.

4. Intermixed with the corpuscles already described are others to which I wish to allude with the greatest caution. Frequently a globule has been observed for some time, and finally disposed of as being merely an oil one, when suddenly it is seen to protrude a portion of its substance, retract it, and while so doing, another protrusion becomes visible at some other portion of the little mass, and then, perhaps, it will shift its position, exactly after the manner of an amœba.

Are frequently hyaline, but generally granular.

These are frequently hyaline in a fresh stool, but generally granular; no trace of nucleus or contractile vesicle can be observed; sometimes they are very numerous, but when there are other corpuscles in the field which act in a somewhat similar manner, it is impossible to say to which class they belong, unless, indeed, they move across the field like an ordinary amœba, and not merely content themselves with protruding portions of their substance into the surrounding fluid, as was stated the corpuscles in the last described kind did. I am not in a position to state that these are the "still" and amœboid conditions of more than one kind of animalculæ; probably they are, but that they are so of one kind, I think I may state pretty definitely; and, as they are sometimes distinguishable in the still globular condition for a considerable time, they really may have been the bodies seen by Professor Hallier, and mistaken by him for swollen spores; most frequently, however, they are of short duration.

Possibility of their having been mistaken for swollen spores.

The cause of this variableness I am not in a position to state.

These bodies were noticed very early in the course of the inquiry, and every particular concerning them noted; but I have to confess that not a few links are wanting in the "life history" of these animalculæ, which the following illustrations will but too plainly demonstrate.

Illustration I:—

A pale, straw-coloured, perfectly liquid stool, in which the sediment was

EXPLANATION OF PLATE XIII.

	FIGS.	NOS.
Hyaline appearance occasionally seen, when examined early, of the cells associated with the *flocculi* in rice-water stools	xl.	
The granular aspect presented by the preparation delineated at xl after 24 hours ...	xli.	
Animalculæ which appeared in the evacuation on the fifth day. These generally present a distinct nucleus and frequently two anterior filaments, which the animalculæ figured in plates xv and xvi do not	xlii.	
The *flocculi* and the cells imbedded therein observed to be granular, although examined almost immediately. The granular mass observed at the upper corner of the figure may be defined as a Micrococcus Colony, produced by the disintegration of the substance into molecules	xliii.	
Movements exhibited by the corpuscles associated with the flocculi when freed from the meshes of the membranaceous substance	xliv.	
Appearance of the *corpuscles* associated with the *flocculi* after the addition of weak acetic acid and iodine	xlv.	

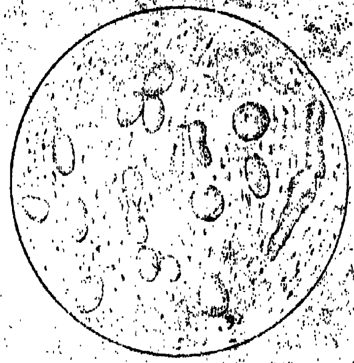


FIG. XL. ×600
Early condition of cells imbedded in the flakes.

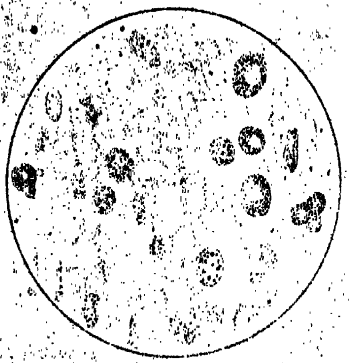


FIG. XLI. ×600
The same as XL. after 24 hours

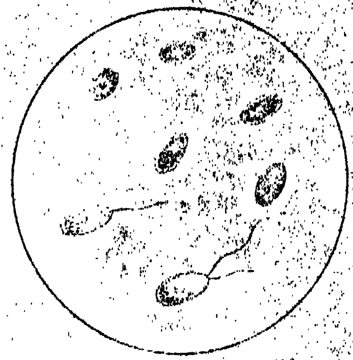


FIG. XLII ×600
Amœbulæ which appeared on 5th day

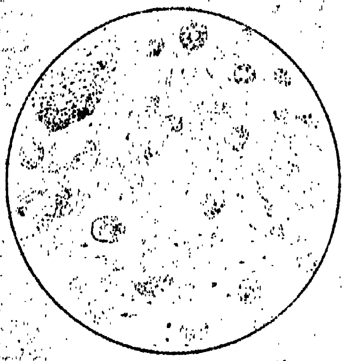


FIG. XLIII ×600
Early appearance of granular condition of flakes.

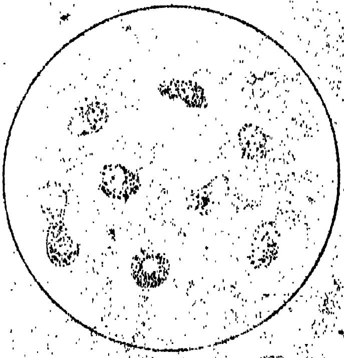


FIG. XLIV. ×600
Movements assumed by the [illegible] associated with the Flocculi

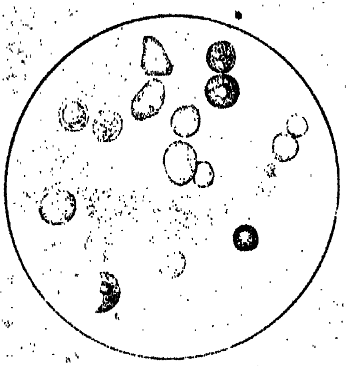


FIG. XLV ×600
Appearance after addition of weak Acetic Acid and Iodine

T. R. L. del.

FIGS. XL–XLV. FLOCCULI &c. IN CHOLERA STOOL.

1000th of an inch ——— ×600

very scanty, was obtained from a patient in the cold stage of cholera. The dejections being passed involuntarily, numerous little heaps of *sarcinæ* were present (Fig. xlviii), as indeed exist to a greater or less extent in nearly all the cholera evacuations examined, with numerous masses of a granular or jelly-like substance, in which yellow translucent lumps are imbedded, probably of a fatty nature (Fig. xlix, 1); together with masses of a somewhat similar outline observed to alter in form very slowly, as at 2. In some cases a pellicle becomes evident, when the contained jelly-like protoplasm contracts, as at 3, the various forms assumed by which are represented at Figure l, with a great number of more or less spherical bodies very like oil globules (Figure li); some are seen to be flattened out (1), others protruding a vesicle exceedingly slowly; the body at No. 2 becoming in the course of five minutes to the condition delineated at 3, 4, 5; whilst great numbers of a minute animalcule were seen actively moving among them all; sometimes one flagellum is seen—a posterior one, at others an anterior one also, both being retractile at will, and another may be darted forth out of any portion of its body. No organized structure can be seen, neither mouth nor eye spot, nor any trace of contractile vesicle, merely a spindle-shaped speck of jelly enclosed in a delicate elastic sac, endowed with the power of rapidly altering its shape and position (Fig. lii). So capable are they of adapting themselves to circumstances as to be able to insinuate themselves with the fluid through the meshes of fine blotting paper. All these were present to a greater or less extent for a week.

Presence of sarcinæ almost universal in cholera stools.

Alterations in the form of the spherical bodies very gradual.

Presence of exceedingly active animalculæ;

structureless; perpetually changing in form.

A drop of the fluid was placed on a hermetically sealed slide, and the little bodies remained active until the fourth day, when they gradually ceased to present any kind of motion, but settled down into irregular little masses of jelly-like appearance, to which condition also the corpuscular bodies had been reduced (Fig. liii). On several occasions, however, the animalculæ were seen to become more than usually active for a short time, before ceasing altogether: to push out processes in all directions, and as quickly taking them in again, finally settling down as shapeless little pellets. Some of the various forms assumed by *one* of these at this stage are sketched in Figure liv.

Transition from the active to the "still" condition.

Illustration II:—

A condition precisely similar to the foregoing was observed in the evacuation of another man a few hours before death, as well as in the contents of the large and small intestine at the *post-mortem* examination. The action of re-agents is much the same as on any other hyaline protein globule.

They remained unaffected by strong *acetic acid* for ten minutes; gradually, however, the contents contracted more or less regularly, thus allowing of a delicate capsule being brought to view (Fig. lv, 1). After a time the contents vanished, merely a finely granular ring being left (2); *absolute alcohol* made the contents appear granular, as at 3, whilst some appeared but little affected; *ether* subsequently being added caused them to shrink considerably, but did not dissolve them (4).

Action of re-agents.

Iodine stains them a brownish-red and makes them appear somewhat granular (5).

In order to test whether some of them might not be "spores," a series of observations was commenced, some of which have already been described in the chapter on "Cysts" (page 11).

A growing-cell was prepared on the Reverend Mr. Berkeley's plan, by drawing a ring of varnish on the glass slide, allowing it to become nearly dry, cleansing it, as well as the covering glass, thoroughly with spirit and distilled water. A *droplet* of the evacuation was then transferred to the centre of

Mr. Berkeley's growing-cell.

the cell (Fig. lvi), care having been taken that no part of the sides was touched by the fluid when the covering glass was applied.

It was afterwards hermetically sealed, sufficient air being already enclosed to allow at least of germination. The limited area of the preparation enabled the geography of various objects to be easily remembered, and tended very materially to precise observation.

On the second day the corpuscular bodies appeared to be more granular or less like oil globules, frequently with one or more indistinctly visible vacuolæ (Fig. lvii, 1); many are elongated and presenting very slight movements (lvii, 2). A few animalculæ were still present; germinating spores were also visible.

Transition of the "still" to the active condition on the third day.

On the third day the circular and oval bodies had almost entirely disappeared, but on approaching the margin of the fluid immense numbers of the animalculæ, to the extent of half the field of the microscope, were seen moving about with great rapidity and perpetually altering their form, a clear space being observed in some of them (Fig. lvii, 3).

Return to the "still" condition.

On the fourth day the activity of the little animalculæ had diminished, many were gradually re-assuming the circular condition. Thinking that this was an indication for a fresh supply of air, the varnish was scratched away from a small portion of the side with a needle, watching the effect under the microscope while doing so. They did not appear to be particularly affected by this proceeding, for in the course of an hour they had all become circular, and almost motionless; many attempts were made to get at a more complete life history than this, but hitherto without success.

After becoming dried may be revived by the addition of fluid.

The duration of the corpuscles and of the active animalculæ is very variable, sometimes easily recognized in stools which have been kept for a month; on other occasions disappear in a few hours. They have frequently been seen after having been thoroughly dried to re-assume active movements on the addition of fluid; but exposure to the sun at a temperature of 120° *Fahr.* stops all movements, no matter in what fluid they are placed, becoming sometimes completely disintegrated, but they will re-appear in such a fluid after a time under favourable circumstances—probably new ones being developed. These bodies are not confined to any particular stage of cholera, as the following will prove.

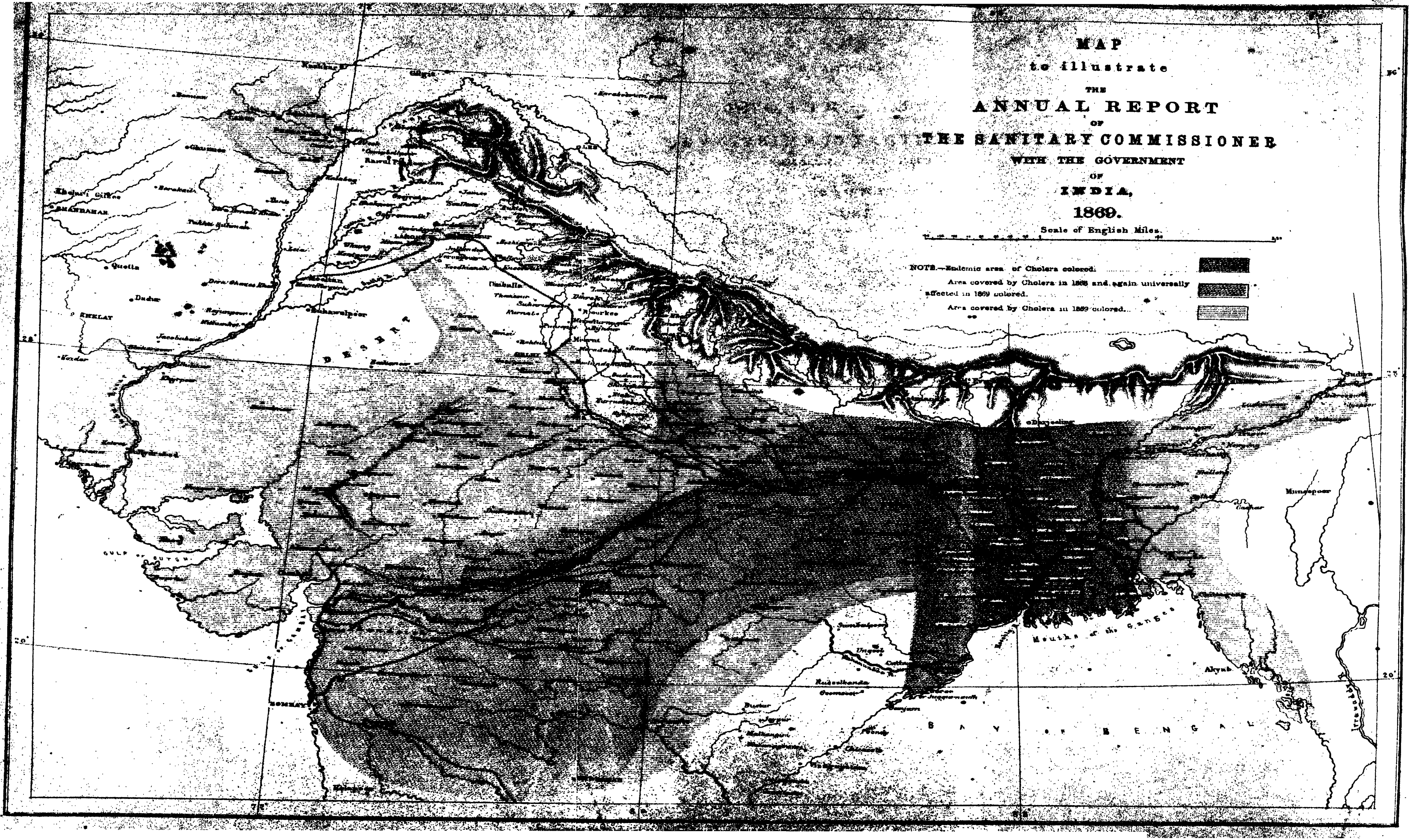
Illustration III:—

Circular corpuscles presenting amœboid alterations of shape, associated with blood-cells and animalculæ.

The dejection of a person, shortly after the first symptoms of cholera set in, was obtained for examination. It was about the third liquid stool, of a pale yellow colour, slightly alkaline to test-paper, with the average amount of sediment. This consisted almost entirely of the bodies sketched in Figures lviii to lx. *First*, a number of large granular cells, very delicate filmy spheres, rolling about under the covering glass (Fig. lviii) frequently, as if undergoing the process of division; *secondly*, corpuscles of the same granular appearance, but generally somewhat

EXPLANATION OF PLATE XIV.

	FIGS.	NOS.
The elongated form very commonly observed of the corpuscles imbedded in the flocculi. Some are granular, others are hyaline	xlvi.	
Appearance presented by the preparation (xlvi) after the addition of iodine solution ...	xlvii.	
Sarcinæ, as commonly observed in cholera and other stools	xlviii.	
Accumulations of a fatty nature	xlix.	1
Little pellets which possess the power of altering in form and position	..	2
Forms assumed by *one* of the foregoing		
Very active animalculæ		
Various forms assumed by the gelatinous-looking substance depicted at xlix, No. 3 ...	l.	
Animalculæ in a globular "still" condition	li.	1
Various forms assumed by *one* of the foregoing	„	2-6


Scale of English Miles.
NOTE.—Endemic area of Cholera colored. ▩
Area covered by Cholera in 1868 and again universally affected in 1869 colored. ▨
Area covered by Cholera in 1869 colored. ▤
Quetta
Dadur
Khelat
Desert
Umballa
Delhi
Gulf of Cutch
Bombay
Darjeeling
Munneepoor
Mouths of the Ganges
Bay of Bengal
Akyab
Irrawaddy R.
20°
25°
30°

MAP
to illustrate
THE
ANNUAL REPORT
OF
THE SANITARY COMMISSIONER
WITH THE GOVERNMENT
OF
INDIA,
1869.

REPORT

VACCINATION

PROVINCE OF BENGAL

1880-81.

[illegible]3
/G

ROBERT LIDDERDALE, M.D., SURGEON-MAJOR,
Sanitary Commissioner for Bengal.

Calcutta:
PRINTED AT THE BENGAL SECRETARIAT PRESS.
1881.

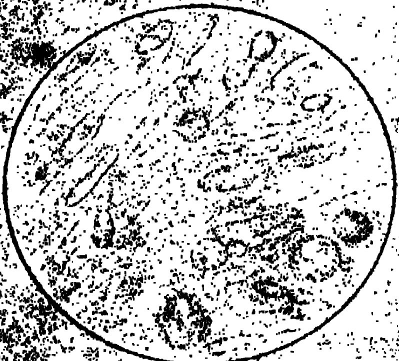


FIG. XLVI [illegible]

[illegible] in the Cholera [illegible]

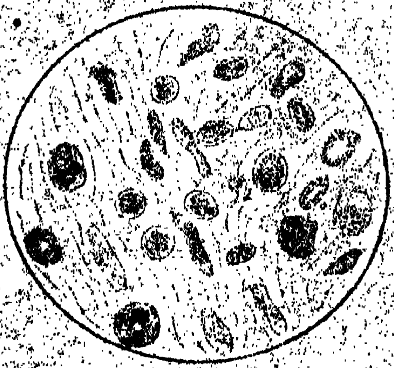


FIG. XLVII [illegible] 800

Effect of Iodine on the Corpuscles

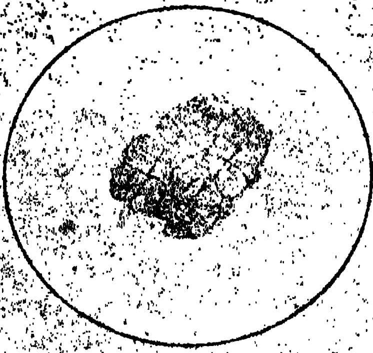


FIG. XLVIII [illegible] 320

Sarcinæ in Cholera stool

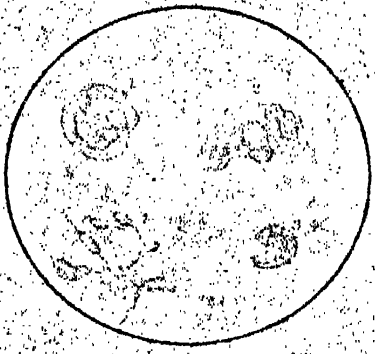


FIG. XLIX [illegible] 320

1. Fatty masses

2. [illegible] in various stages

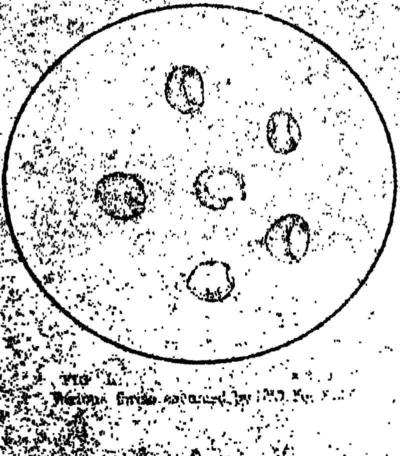


FIG. L [illegible]

Various forms assumed by [illegible]

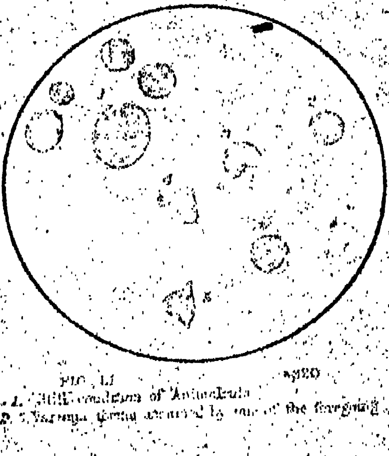


FIG. LI [illegible] 320

1. Still condition of Animalcula

2. Various forms assumed by one of the foregoing

[illegible] del.

Printed by [illegible]

FIGS. XLVI – LI. VARIOUS OBJECTS IN CHOLERA STOOL.

[illegible] 1000th of an inch ——— 320

——— 800

smaller, from which filmy vesicle-like projections were seen to proceed very, very slowly, and as slowly retracted, followed by a similar protrusion from another portion of its substance (Fig. lix, 1), or two or more may be seen at the same time (2). The granular and minutely molecular matter did not enter into these saccules, and I am not certain whether an inner or an outer wall exists, but sometimes it seemed very like as if the outer gave way for a filmy inner lining to come forth (3), at other times it seemed quite the reverse (4). After a short time the projections in many cases appeared no longer to be retracted, and were seen to curve upon the cell as the evaporating fluid bore it along (5). Some, however, are seen to' be of larger size (6). *Thirdly*, blood-cells which have assumed very peculiar outlines, the result of *diosmosis* (7); and *fourthly*, innumerable animalculæ, of the kind already alluded to, exhibiting great activity amongst the various cells in the field (8).

Animalculæ attaching themselves to blood-cells.

The patient died on the next day, but a stool was examined a few minutes before death; it was highly coloured with blood and contained a great number of animalculæ (Fig. lx). Some of these were tugging at the blood-cells and altering their form, distinctly pulling the pellicle or cell envelope away from the enclosed plasma. No. 1 was altered to 2, 3, and 4 in the manner described and shown in the figure. The animalculæ presented an unusual appearance; either a large clear space existed in most of them, of the same size as the blood-cells, or one or two blood-cells had become engulphed in their homogeneous substance. In some cases they were distinctly seen to be merely adherent, the little creature rushing along as if it had no burden.

The next day the blood-cells had become granular, but the animalculæ were as plentiful as ever, and continued so for a fortnight, everything else having broken down.

Are any of those corpuscular bodies peculiar to cholera?

Having now given a brief account of these few classes of corpuscular bodies, and shown that none of them were seen to germinate like the spores of fungi, the question naturally arises—Are any of them peculiar to cholera?

The *first* and *second* classes of corpuscles.

The *first* class, namely, those of a fatty nature, need not be considered, for no one will suppose them to be peculiar to the disease; the same may be said concerning the presence of blood, and as to the shape assumed by its corpuscles, the figure already given in connection with "chylous urine" will show that there is nothing peculiar about it, nor yet about the amœba-like movements of the blood-corpuscles, as the following easily-repeated little experiment will show.

Changes occurring in freshly drawn healthy blood when placed in fluid.

A small portion of a slightly alkaline cholera evacuation was filtered off into a test tube, and having pricked my finger, a few drops of blood was allowed to fall into the fluid, with which it was immediately mixed, and a drop of the mixture transferred on a slide to the microscope; nearly all the red cells were seen to present a stellate or eechinnulate appearance (Fig. lxi, 1); only a few white corpuscles were visible, and these presented a granular, more or less circular outline (2). Some, however, were spread out like an amœba (3), but no movements were seen. In the course of two hours the stellate form of the red cells had disappeared, and presented the various forms commonly seen in evacuations (4). Having been unable to see any of the white cells protrude portions of their substance, it occurred to me that perhaps the temperature of the fluid being only 80° was the cause; consequently another portion of the fluid was filtered and carefully warmed up to 110,° when a drop or two of freshly drawn blood was introduced. This time a very slightly granular white cell was seen to alter its form and protrude one or two vesicles from its substance (5), and draw them in again, which it continued to do for a few minutes, then ceased, becoming more granular than it was before. Others were observed to act in the same

Warming the fluid favorable to the exhibition of amœboid movements in the blood-cells.

way; one pale white cell was seen to possess a very delicate filmy capsule, extending some distance beyond the contents (6); it suddenly vanished altogether, leaving a merely irregular granular heap to mark its position.

The *fourth* class of corpuscles.

Actinophrys-like stage.

The *fourth* class (it will be more convenient to consider the third afterwards), namely, the various stages of the animalculæ, was for a considerable time the subject of much curiosity, especially the kind described as presenting such activity. The fact of their being almost universally present in choleraic dejecta, and yet never, as far as I know, alluded to, except indeed that Thiersch of Erlangen could have seen one of these on the point of passing into the "still" condition, during which stage pseudopoda are incessantly projected in all directions, when he speaks of having observed actinophrys-like bodies in some choleraic dejecta which he had examined, and wondered what they were.* There was some difficulty in tracing this body to any of the described species of animalculæ. Its minute and rapid motion added to the difficulty, as well as the variableness of its shape, because although generally spindle-shaped, it may become round, triangular, or stellate in less than a second; frequently a succession of pseudopoda are seen projected in a wave-like manner, as if lashing the fluid when about to pass out of the active state. It is generally hyaline, but may be granular; sometimes a vacuole is observed, but a contractile one never. There is always a very delicate posterior filament, at first continuous with the sarcode, and a still more delicate anterior one, both retractile.

Probable family to which the animalcule belongs, and its connection with water.

In some respects it agrees with the description of the Monad *Bodo*, but as Cienkowski, in his celebrated article in Schulze's "Archiv," distinctly states that in the amœbiform stage of all the true monads the *pseudopoda* are pointed, whilst in the amœbiform stage of this animalcule the projections are, I think, invariably rounded, so that for this and other reasons, which need not be entered into here, room may probably be found for them among the Astasiæa or Euglenæa family, so common in our tanks. The association of a cholera entozoon with the euglena, one species of which, when in its mature condition, causes the red colour observed in so many pools, and which Ehrenberg thought was the means by which the miracle was brought about of turning the waters of Egypt into blood,—the finding of precisely similar animalculæ in drains, gave rise, as may be supposed, to not a few very pretty theories, which, I regret to say, like many others, had to be abandoned altogether.

Found in other than cholera stools.

A gentleman, with whose personal habits I am well acquainted, suddenly felt some griping pains with inclination to go to stool, but was otherwise perfectly healthy. The motion was very scanty and very diluted, but was followed by immediate relief. It occurred to me to subject the stool to a microscopic examination, and, to my surprise, these animalculæ, both in the active and "still" stages, were present in the most perfect condition, together with numerous globules of a fatty nature, exactly similar to those already alluded to.

EXPLANATION OF PLATE XV.

Illustrating the various stages in the existence of the animalcule which have been observed in alvine dejections.

	FIGS.	NOS.
The aspects usually presented by these animalculæ when seen in evacuations ...	lii.	
Appearance of the preparation delineated at figures xlix—lii on the fourth day; many of these jelly-like masses are animalculæ which have become inactive	liii.	
Various forms assumed by a single animalcule immediately before it became inactive, as at liii.	liv.	
Effect of re-agents on the masses depicted at liii.	lv.	
After the addition of acetic acid	"	1–2
——————— absolute alcohol	"	3
——————— ether and alcohol	"	4
Mr. Berkeley's growing-cell	lvi.	
Three stages in the "life history" of the animalcule, above described, which were followed out by continuous observation in the Berkeley-cell	lvii.	

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* The animalculæ alluded to in this Report do not in any way resemble the figures of the actinophrys-like protozoa accompanying Dr. Sanderson's account of his celebrated experiments published in Mr. Simon's Ninth Report.

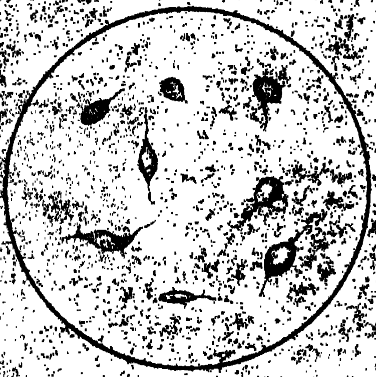

FIG. LII × 430
Various forms assumed by the Animalcule

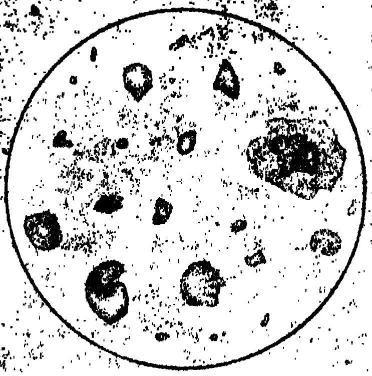

FIG. LIII. × 430
Gelatinous masses which replaced the objects in figs. XLIX – LII.

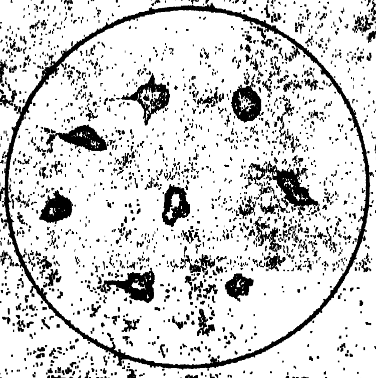

FIG. LIV. × 430
One Animalcule gradually becoming inactive

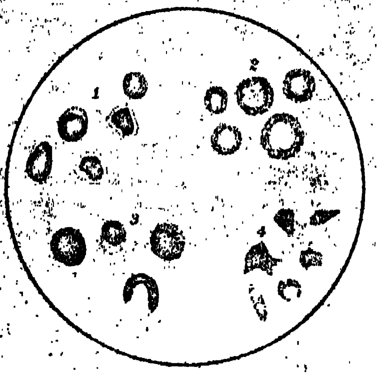

FIG. LV. × 430
Effect of re-agents on LIII. 1.2. Acetic Acid 3. Absolute Alcohol. 4. Ether & Alcohol

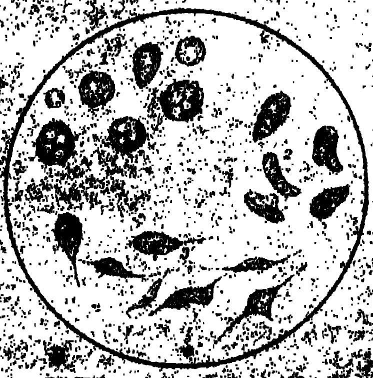

FIG. LVII. × 430
1. Animalcules still and granular 2. Become amoeboid on 2nd day _ afterwards active 3.)

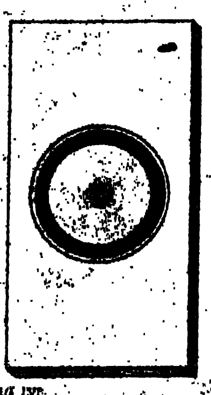

FIG. LVI.
Mr Berkeley's "Growing-cell" Natural size)

FIGS. LII–LVII. STAGES IN THE EXISTENCE OF THE ANIMALCULE
AND THE REVD MR BERKELEY'S GROWING CELL.
1000th of an inch ________ × 430.

A comparison of the figures here given (Figs. lxii—iv) with ones previously described will, I think, be sufficient without repeating that description.

The next stool passed by this individual was also a relaxed one, and microscopically of the same character, after which the motions were perfectly natural; but, in proportion as the motions became more solid, the ease with which these animalculæ could be found diminished. Many other ordinary evacuations were examined, and in fully half, after more or less careful search, they were discovered. After a brisk purgative they are frequently seen in great perfection.

The *third* class of corpuscles.

Difficulty of distinguishing these from the amœboid stage of animalculæ, because

In alluding to the nature of the *third* class of bodies, namely, those found in the meshes of the fibrillated substance composing the flakes in cholera evacuation, I wish to premise that the remarks are reservedly made, as the subject belongs more directly to the pathological anatomy of cholera, which subject forms a later part of the programme drawn out for guidance in connection with this inquiry. It will, of course, be understood that the corpuscles of the former three classes are also found with the corpuscles forming this division; indeed, it is frequently impossible to separate them, especially from those amœbiform conditions of animalculæ which are seen so frequently in evacuations. This is probably the reason why so many different descriptions exist of their appearance and of the action of re-agents.

these corpuscles exhibit somewhat similar movements.

Absence of epithelium in cholera stools.

Shedding of columnar epithelium during life advanced by Boehm.

Supported by many German writers

and by Beale and Macnamara,

but contradicted by Parkes, who maintains that it is only present after death.

Now, the chief statement I have to make concerning the corpuscles of this class is, that they *exhibit movements somewhat like the movements associated with the amœba.* This fact may, by very careful examination with a good ⅛ of an inch object-glass, be verified by any one accustomed to the use of the microscope in most cholera stools when perfectly fresh. A portion of the substance of the corpuscle is seen to creep out insensibly from the mass, and as insensibly return: unless the eye is carefully fixed on the body, and is already a more or less educated eye, the phenomenon is not detected, and the observer enters it as "disintegrated epithelium" in his note-book. It may perhaps be remarked that no drawing of columnar epithelium, said to be so universal in cholera dejecta, appears in this report. The reason is, that its presence, to an appreciable extent, has not been observed in the contents of the intestines discharged during life; indeed, the only occasions on which I have been able to observe it quite distinctly were in discharges voided a few minutes before death, a long interval having elapsed since the occurrence of a previous stool. It was Boehm, I think, who first laid great stress on the fact of the shedding of the epithelium in cholera about 1832, since which period it has been the general opinion in Germany, with the exception of Virchow and a few others. In the well known Bavarian report of 1857 I find great prominence given to this view, modified, however, by the remark that, as a rule, only the broken down epithelium, or rather freed nuclei of such, are seen. Dr. Beale also lays great stress on the diseased condition of the epithelium, and the latest authority on the subject, Dr. Macnamara, follows Dr. Beale; indeed, it is evident that Dr. Macnamara's explanation of many of the phenomena observed in this disease is based upon a conviction of the correctness of the views advanced by these writers. It is of the utmost importance in matters of this kind, as was pointed out by Professor Parkes in 1848, not to confound the microscopical appearance of the rice-water stools passed during life with that of the contents of the intestine obtained after death. In a *brochure* which was published by him on this subject at the time I find stated:—"With regard even to the separation of the epithelium, although from the facility with which this structure is shed, even during ordinary healthy processes, it does appear probable, *à priori*, that it would be largely thrown off in cholera, *there is absolutely no proof that it is so thrown off until after the death of the patient. The stools contain none, or a quantity not more considerable than is present in common diarrhœa.*"[*] Judging from the cholera stools which have come under my observation in Calcutta,—several hundred specimens,—I believe that not more than two out of twenty slides will contain distinct traces of columnar epithelium.

Reasons for believing that these corpuscles are not broken down epithelium nor their freed nuclei.

Probable identity of the corpuscles with those described by Parkes as "peculiar bodies."

That these corpuscles are the remains of discased epithelium may, I think, be disproved without any reference to *post-mortem* appearances, which I wish at present to avoid; *first*, by the fact that, under favourable circumstances, they *exhibit movements exactly analogous to those seen in the blood, pus, lymph, chyle, and the so-called "mucus" corpuscles. Secondly*, cell formations and minute flocculi, microscopically identical with these, may frequently be observed under other conditions, and from sources where it would be difficult to account for their presence were they epithelium fragments, such as in the fluid obtained by pricking a blistered surface. *Thirdly*, that even where portions of columnar epithelium are seen, they will, I believe, almost invariably exhibit, no matter how much broken down the cell appears, the delicate rim or basement membrane lining the free end of the cell, believed by some to be pores communicating with the cell. The presence of epithelial fragments, when not excessive, may be readily accounted for by the process of renewal which takes place in all cells. Dr. Sharpey writes:—"The particles of columnar epithelium are undoubtedly subject to shedding and renovation. According to Donders and Kölliker, the columnar cells on the villi appear occasionally to cast off parts from their upper ends, with subsequent reparation of the loss; that is, a cell enlarging, and a second nucleus appearing; the upper and broader part with its nucleus and much of the cell contents separates, and the lower remaining portion with its nucleus grows again to the natural size." And, *fourthly*, the epithelium thus discovered in the dejecta will remain for weeks unchanged in the fluid in which it was found, showing that the action of the liquid portion of the stool is not so destructive to it as would be inferred if the numberless corpuscles seen were the result of the disintegration of epithelium which had been shed. I think there is no doubt but that these are the "peculiar corpuscles" first described by Dr. Parkes, with probably the circular, "still" condition of the animalculæ alluded to in this report, the microscopic appearance and the action of re-agents coincide so

EXPLANATION OF PLATE XVI.

	FIGS.	NOS.
Large granular cells, amongst which very active animalculæ are seen (cholera evacuation)	lviii.	
Cells associated with the foregoing (lviii) and closely resembling them, but exhibiting pseudopodial movements	lix.	
With a single vesicle-like protrusion	„	1
Exhibiting protrusions from more than one portion of its substance	„	2
The projected pseudopod appears to have passed through an external envelope in one case (3), whilst the projection seems to consist of the external layer itself in the other (4)	„	3–4
Projections which were no longer retractile	„	5
A large corpuscle presenting movements of an amœboid character	„	6
Blood-cells altered in appearance; the result of osmosis	„	7
Animalcule (cholera stool)	„	8
Blood-cells	lx.	1
One of the blood-cells from the group (No. 1) altered in appearance by one of the animalcules	„	2–4
Animalculæ with blood-cells intimately adherent to their substance. The animalculæ in this case are somewhat larger than ordinarily met with (cholera stool)	„	5
Appearance assumed by blood corpuscles from a *healthy* person, which had been added to a portion of filtered cholera stool	lxi.	
Stellate appearance of the red cells	„	1
White corpuscles	„	2
White corpuscles spread out like an amœba	„	3
Subsequent aspect of the red cells. The condition usually observed when found in alvine discharges	„	4
The alterations observed to take place in a single white corpuscle	„	5
White corpuscle surrounded by a halo-like pellicle	„	6
Corpuscles and animalculæ observed in the stool of a perfectly *healthy person*	lxi–lxii.	
As seen immediately after being voided	lxii.	
As they appeared 24 hours later	lxiii.	

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[*] The italics are mine.

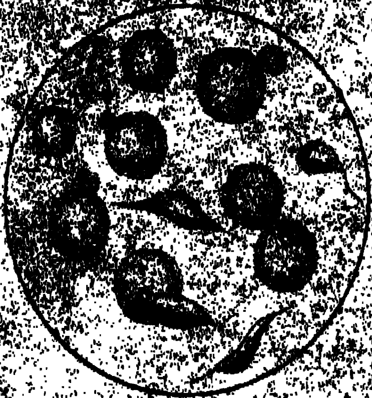


FIG. LVIII. ×600

Large granular cells intermixed with Animalcules in the active condition. (Cholera.)

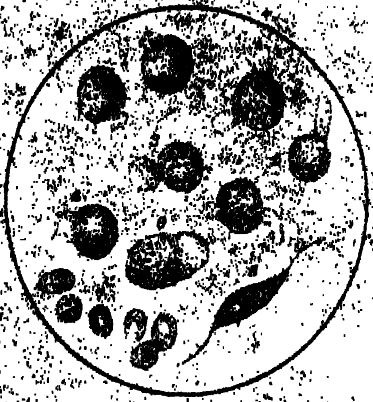


FIG. LIX. ×600

Same stool as LVIII.

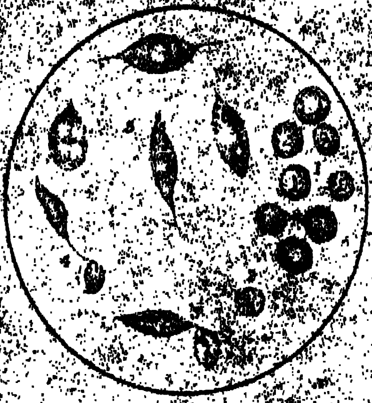


FIG. LX. ×600

Animalcules altering the form of blood-cells (1-4). 6. Animalcule with blood-cells attached.

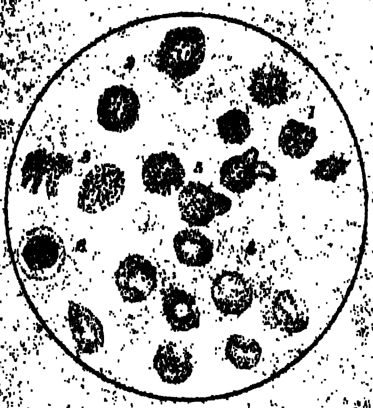


FIG. LXI. ×600

Healthy blood-cells placed in some cholera stool. (Filtered.)

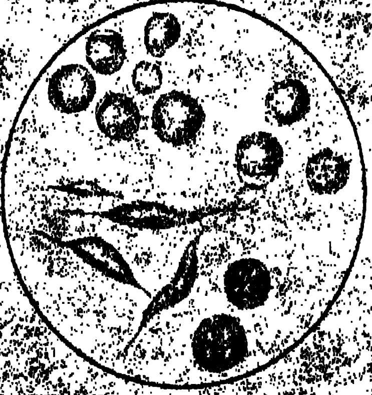


FIG. LXII. ×600

The Animalcule as found in the stools of a healthy person.

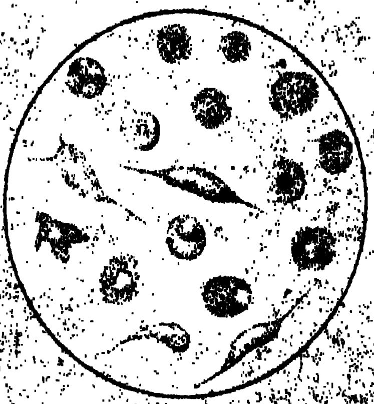


FIG. LXIII. ×600

Same as LXII, 24 hours later.

1000th of an inch ×600

FIGS. LVIII–LX. EXAMINATION OF CHOLERA STOOL.
LXI. HEALTHY BLOOD IN DITTO.
LXII. LXIII. ORDINARY STOOL.

entirely with the minute description given of them in the author's work. I am as yet not in a position to verify the author's belief that they are confined to any particular stage of the disease. I hope, however, to obtain more exact data on the subject in my next report.

Their probable nature, a modification of fibrine.

With respect to the nature or origin of these corpuscles and the fibrillated substance in which they are imbedded, I have not been able to disprove, nor in any way to modify, the views expressed by the writer at the time when he drew attention to them in the following extract, which may appropriately serve as the concluding sentence of this paragraph:—

"It is in the highest degree probable that they owe their origin to effused blood-plasma, which assumes with great rapidity a low, ill-defined, and non-progressive organisation."

SECTION III.—"MICROCOCCUS."

Usual meaning attached to the term "micrococcus."

The term "micrococcus" (*mikros* small, and *kokkos* kernel) is now pretty generally adopted on the continent by the class of writers who advocate the pre-existence of a GERM, in some shape or other, to every living thing, this germ, which may be infinitely minute, being called its "micrococcus;" whereas another class of writers, very numerous now in England as well as on the continent, maintain that the pre-existence of a germ is not necessary to the development of living objects, providing certain atmospheric, chemical, physical, and other agencies are present; the nature of the object developed depending on the relative proportion of these agencies or "forces." In short, that life is a creature of circumstances, those circumstances being of an entirely physical nature. The question of the existence or non-existence of a "germ" being of such great importance in connection with epidemics and infectious diseases generally, and its investigation associated with so many difficulties, I should have preferred not alluding to the subject of this section at present, not having had time to accumulate sufficient material to enable me even to obtain a clear idea as to what changes take place, much less to attempt passing any opinion concerning those changes. As, however, it might be thought that no attention had been given to this portion of Hallier's theory,—in some respects the most important, and certainly the most difficult to disprove,—a few illustrations will be given of what has been done in the matter.

Reasons for not deferring the consideration of the subject of this section.

Hallier maintains that the germs of cholera are the disintegrated spores of a special fungus.

As already explained, the micrococcus, or germ of *cholera*, is, in the opinion of Hallier, the disintegrated spores of a special fungus, which escaping into water may be swallowed, or after being wafted by the air, adding a trifle to the "dust," according to Professor Tyndall, so prevalent therein, reach the interior of the human body, there to develop at the expense of the nitrogenous material, notably the epithelium of the intestinal canal.

It will, of course, be evident that the attempts, already described, to produce a peculiar fungus by cultivation of choleraic discharges in which bodies somewhat resembling "cysts" and "spores" existed, equally favourable conditions were at hand for the development of their ultimate elements;—seeing, however, that the fungi which then appeared possessed no peculiarity, one may conclude that either the attempts to cause the development of the particular micrococcus of cholera were failures, or that no cholera "micrococcus" existed, at least not as the germs of a fungus.

The statement that monads and vibriones are more plentiful in choleraic than in other discharges

During the earlier part of the inquiry it was thought that a greater number of minute bodies of an organic nature existed in cholera stools than were found elsewhere; to this impression the mind was evidently, though unconsciously, predisposed, from the fact that the fermentation theories of cholera necessitated, to a more or less extent, the supposition that [*]monads, bacteria, and vibriones (Fig. lxiv) flourish to a greater extent in this than in other diseases. Thus far I have not found this to be the case; indeed, the discharges of cholera patients, if examined immediately, do not contain such quantities of these minute bodies, especially if the stools have been voided in rapid succession, consequently have not been long detained in the intestinal canal. Neither have I been able, after repeated observations, to find that, during the decomposition of a cholera discharge, a greater number of the minute bodies associated with putrefaction were developed in it than were developed under similar circumstances, such as the amount of heat and moisture, in ordinary alvine discharges; nor have I been able to find that any peculiar growth, animal or vegetable, will proceed from the one which does not proceed from the other. On this point, however, the number of observations have been far too few—the sources of fallacy being so many—to enable one to speak with confidence, but I trust in the next report to be able to furnish more minute data concerning this matter..

has not been supported by these observations.

The minute organisms associated with decomposition of cholera stools not excessive;

nor microscopically peculiar. This statement is made reservedly.

On an average, out of a dozen experiments undertaken, not more than one is brought to a satisfactory conclusion, which is not to be wondered at, when it is considered that the quantity of matter experimented upon does not exceed one-fourth the size of a drop of water; that this requires the free admission of atmospheric air, and that it has to be examined at least daily, for a month or more, often for hours together. Either the fluid suddenly evaporates, or the lens touches the covering glass, thus disturbing the geography of the preparation; or, which is the most frequent accident of all, and one of the most untoward, a minute spore of some fungus falls from the air upon the moist slide—germinates; the filament insinuates itself through the little air-orifice which had been made in the walls of the growing cells, and reaches the preparation, where it not only obscures the field, but alters the chemical and other forces taking place in that *droplet*, and the forms of life which had developed therein—I do *not* say spontaneously—become altered also. I have frequently observed that a slight disturbance affects the development of these minute organisms; either the forms of life previously present cease to grow, being replaced by others, or the vital process becomes changed, and the manifestations of life take another direction.

Difficulties in ascertaining the nature of minute bodies are not only manipulative,

but dependent to a great extent on their susceptibility to trifling disturbances.

These points will become more or less evident from a perusal of the following examples, which are intended to serve as illustrations of the method adopted in carrying out these investigations, rather than as evidence for or against any particular hypothesis.

In order to be the better able to judge of the significance of the development which might take place in substances obtained from diseased condi-

EXPLANATION OF PLATE XVII.

Illustrations of the development of the lowest forms of life.

	FIGS.	NOS.
Monads	lxiv.	1
Bacteria	„	2
Vibriones	„	3
Leptothrix	„	4
Appearances presented in a filtered solution of organic matter (*unboiled*) on the second day	lxv.	
Ditto third day, showing the appearance of the "heaps"	lxvi.	
Appearances presented in a filtered solution of organic matter (*unboiled*) on the fifth day, vibriones increased in length	lxvii.	
Ditto ditto, circular bodies developed in the midst of the heaps	lxviii.	
Developed on the third day in a solution of organic matter (*boiled*)	lxix.	

---

[*] Irrespective of any theory as to the nature or mode of formation of these minute bodies, I have followed the example of Professor Hughes Bennett in adopting the terms "monads" when simple molecules are meant (Fig. lxiv—1) "bacteria" when the bodies are slightly elongated (2); "vibriones" when still more so (3); and "leptothrix" when presenting a linked appearance (4).

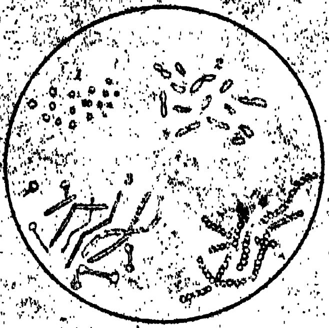


FIG. LXIV. ×500
1. Monads 2. Bacteria
3. Vibriones 4. Leptothrix

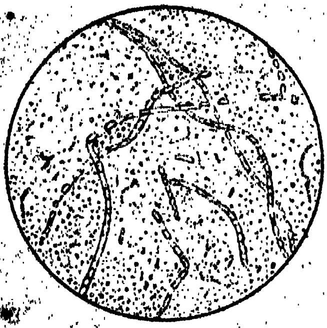


FIG. LXV. ×500
Developed in Organic Solution on 2nd day
(unboiled.)

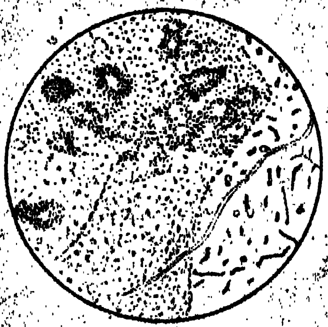


FIG. LXVI. ×500
Developed in Organic Solution 3rd day
formation of "heads"

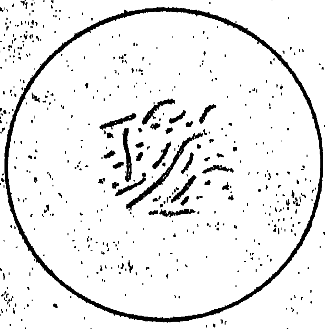


FIG. LXVII. ×500
Developed on 5th day

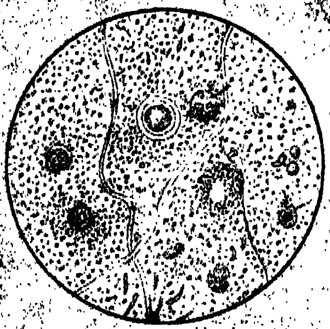


FIG. LXVIII. ×500
Developed on 5th day

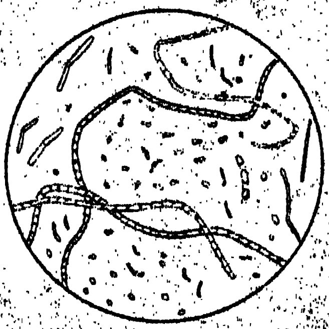


FIG. LXIX. ×500
Developed in boiled Organic Solution
3rd day

C.W. Card Sc.

FIGS. LXIV.–LXIX. DEVELOPMENTS IN ORGANIC SOLUTIONS
1/1000th of an inch ——— ×500

tions, it was considered of the utmost importance that definite knowledge should be acquired of what developed in nitrogenous material, when it was known that no disease existed. With this object in view, solutions were made of various substances, to which choleraic and other discharges were added, careful notes and drawings being made of the changes that occurred from day to day.

Illustration I:—

Developments in simple solutions of organic matter.

As examples of the changes which occur in solutions of ordinary organic matter, the following experiments on watery infusions and decoctions of meat are selected on account of the simplicity of the mixture, and as illustrative of what has been stated above, namely, that slight alterations in their surroundings exert a powerful influence on the forms which living matter will assume.

Cold solution of raw meat;

(a). One ounce of carefully filtered, distilled water was placed in a test tube and a piece of raw meat (beef) about the size of a pea dropped into it, the portion being carefully removed from the centre of a fresh piece of muscle.

milkiness on the second day, due to molecules.

Little "heaps" observed on the third day.

Each "heap" composed of molecules, with a central portion structureless and still.

A few molecules had increased in size on the fifth day.

Contents of the larger molecules.

In the course of twenty-four hours the upper half presented a milky appearance, and there was a very thin film on the surface. It consisted of minute molecules (monads or micrococcus), together with long linked filaments of a larger size than vibriones, which were perfectly still (Fig. lxv). The milkiness of the fluid continued to increase, but the pellicle did not get much stronger, for on the third day, whilst attempting to remove a little, it broke altogether and sank in the fluid. On examination it was found to contain a few long filaments with monads and short vibriones, among which little oval accumulations or "heaps" were seen, as if composed of broken down molecules (Fig. lxvi). The next day the vibriones were considerably longer, but no other change was visible (Fig. lxvii). On the fifth day the "heaps" had increased in number; although they appear granular with a power of three hundred, they are distinctly seen to be molecules by a higher power, such as Ross' ⅛ of an inch object-glass, except the central portion, which seems to be of an amorphous nature, and reflects the light differently. In contact with the particle of meat was a shreddy substance, also containing heaps, in the midst of which round cells of various sizes had developed, from a minute molecule, presenting a brighter appearance than the ones in the field generally, up to cells with a diameter somewhat greater than that of a red blood-corpuscle (Fig. lxviii). The larger ones were seen to be surrounded by a distinct capsule, between which and the contained protoplasm (which had a bluish tint) a little fluid seemed to intervene; this in certain lights presented a red tint. The hyaline substance altered its shape occasionally within its capsule, but the movement was an exceedingly slow one. In the cells a few grades smaller than the ones described, the protoplasm presented a somewhat bluish tint, but of a yellowish-blue when exactly in focus; they also seemed to possess the power of altering their form, or rather to dilate and contract very slowly.

These molecules kept increasing in number and size. As a rule, the larger they are, the more amorphous matter surrounds them; that is, the larger the heap. After this putrefaction set in very rapidly; no further progress occurred, but the whole became disintegrated.

A solution like the foregoing, but thoroughly boiled.

(*b*). A small portion of meat was placed in distilled water as above, and thoroughly boiled for some time in a Florence flask; filtered whilst hot into a clean test tube (which had been previously subjected to the flame of a spirit-lamp); it was then covered, but not so tightly as to prevent the entrance of air, and placed in the same compartment as the foregoing.

Progress during the first week.

On the second day it had become milky, and presented a slight film of a somewhat similar nature to the previous one; little chains (leptothrix) interspersed throughout the field, with a few monads and short vibriones. This appearance was still more marked on the third day (Fig. lxix). On the fourth day the linked filaments were present, but the molecules (or micrococci) had increased in size, which, with the short vibriones, presented great activity. On the fifth day the milky appearance had diminished, but no change could be observed under the microscope.

Towards the end of the third week animalculæ had developed, very like the ones found in choleraic and other discharges.

The resemblance becoming still more striking by the fifth week.

Paramecium-like bodies appeared towards end of seventh week without cilia;

Little "heaps" now formed amongst the molecules, the fluid at the same time clearing up, and towards the end of the third week the slight precipitate which it contained not only presented monads, bacteria, and vibriones, but animalculæ in great numbers, which were seen at one moment elongated and very active, the next circular and still (Fig. lxx), very like the ones above described as occurring in choleraic and other discharges. In some of these, however, one, two, or three contractile vacuolæ were observed lasting about three seconds, and about three seconds absent. In addition to these, a few amœbæ were present, with no contractile vesicle; probably an earlier stage. It was then set aside for a fortnight; the animalculæ were, if anything, more plentiful than before, and when in the active or "still" condition were not distinguishable from the ones described as being found in the stools, as may be seen by reference to Figure lxxi, where, in addition, some green-coloured cells are seen. The latter were not observed to develop into anything higher, although watched carefully on a slide for two months; they simply increased in size and in number. The test tube was set aside for another fortnight, and was found to contain larger animalculæ than before, belonging to the Kolpoda family; no cilia could be made out, but a contractile vacuole was very evident. The various stages in the life history of these animalculæ will be minutely described further on, in connection with other observations.

but ciliated at the end of three months.

At the end of the third month cilia were easily demonstrable. The animalcule very closely corresponds to the *Paramecium Kolpoda* of authors.

Third experiment with same solution.

The test tube adapted for admitting expired air.

(*c*). A portion of the boiled solution of meat used at (*b*) was placed in another test tube, filtered with a perforated cork, in which was introduced a piece of glass-tubing bent a little more than at right angles; one end was dipped into the fluid in the tube, and the other was drawn out to a very fine point, but not perfectly closed up. This was devised with the intention of ascertaining whether expired air would produce any alteration in the forms of life which might subsequently become manifest in the decoction, as a preliminary to future experiments on organisms developed in crowded and empty rooms. With this view, the test tube was breathed into once or twice daily for a fortnight, then set aside in order that a film might have an opportunity of forming.

EXPLANATION OF PLATE XVIII.

Illustrations of the development of the lower forms of life.

	FIGS.	NOS.
Objects presented in a *boiled* and filtered solution of organic matter towards the end of the third week	lxx.	
The animalculæ present in the above solution, which towards the end of the fifth week could not be distinguished from those described as being present in the alvine discharges, both in the active and "still" condition. The nature of the green cells in the midst of the molecules is not known	lxxi.	
Spores developed in another test tube containing a portion of the organic solution used at lxix—lxxi. *N. B.*—This tube had been breathed into	lxxii.	
Ditto in process of germination	lxxiii.	
The appearance of the spores (lxxii) as modified by the addition of gum water	lxxiv.	
Dr. Maddox's slide for cultivation experiments. Two strips of tinfoil are seen to intervene between the glass-slide and the thin covering-glass, with the preparation in the centre. The arrows indicate the spaces left open for the admission of air	lxxv.	

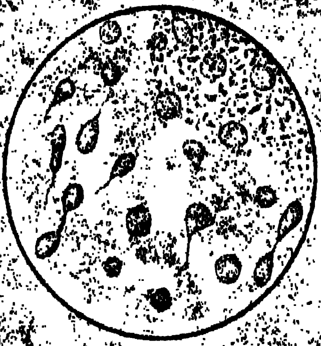


FIG. LXX. ×500
Developed in boiled Organic Solution
[illegible] week

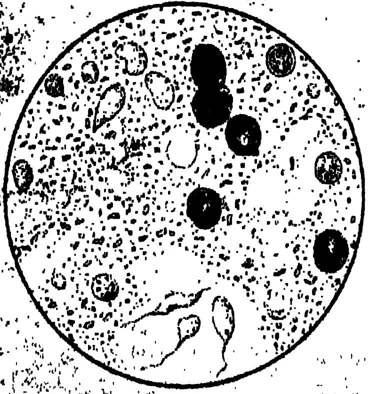


FIG. LXXI. ×500
As LXX. 5th week.

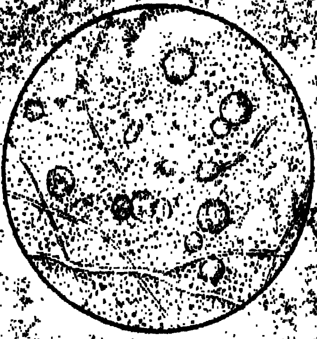


FIG. LXXII. ×500
Developed in boiled Organic & [illegible] water
[illegible] 5th Month

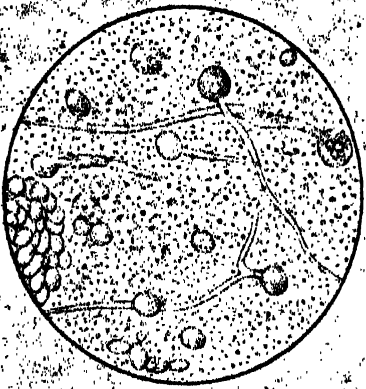


FIG. LXXIII. ×500
As LXXII. Germinating.

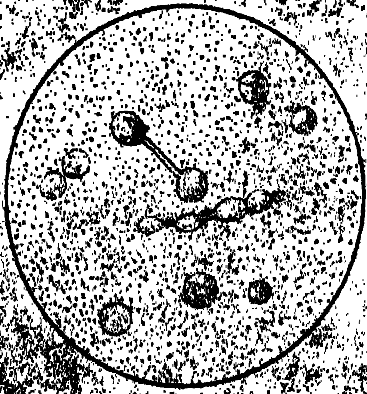


FIG. LXXIV. ×500
As LXXIII, with addition of Gum-water.

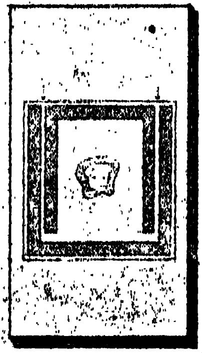
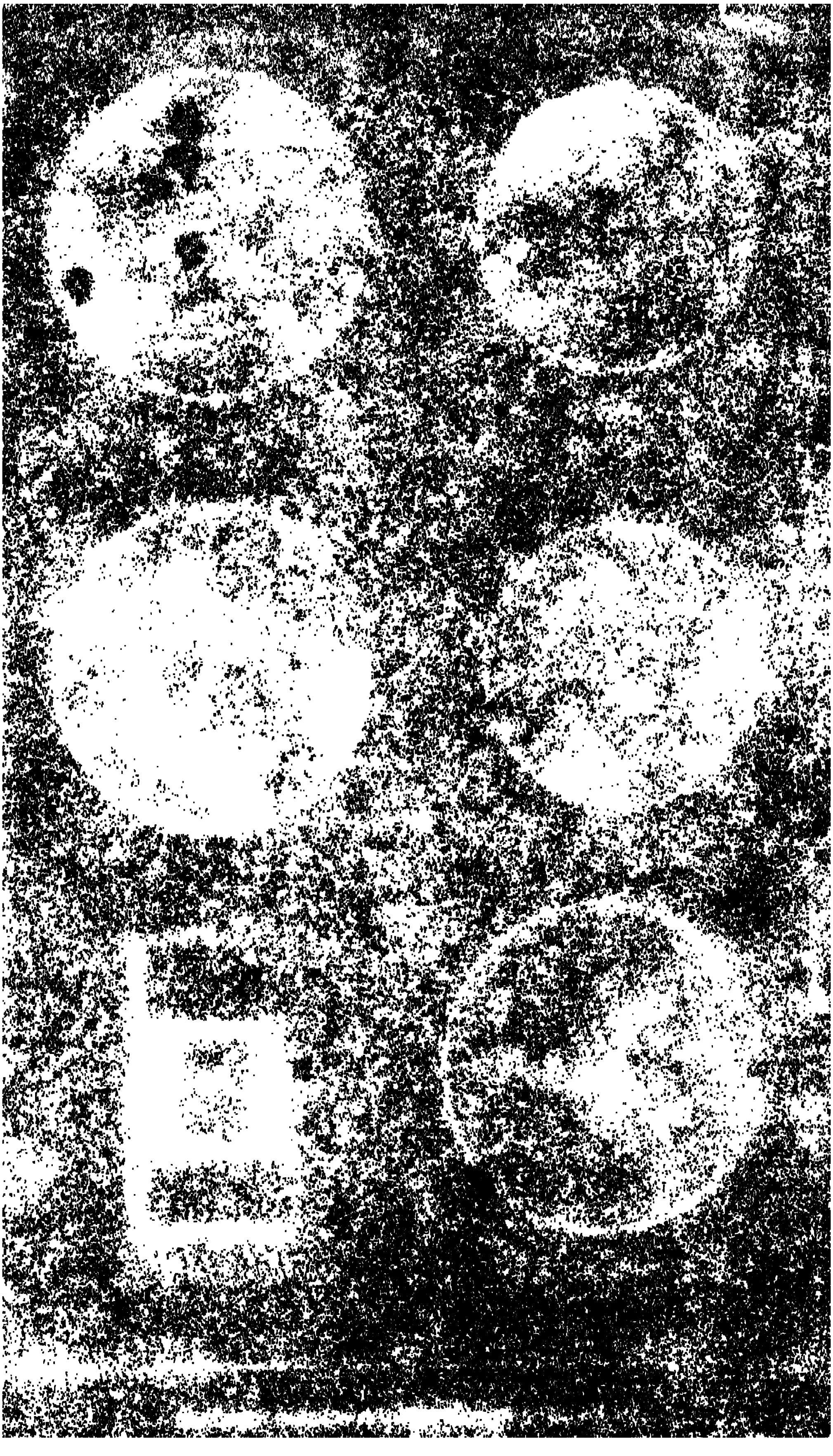


FIG. LXXV. Natural Size
DR. MADDOX'S CULTIVATING SLIDE

FIGS. LXX–LXXV. DEVELOPMENTS IN ORGANIC SOLUTIONS.



When opened at the end of three months

oil-like globules were seen in the film,

At the end of three months the cork and glass-tubing were removed. A delicate film had formed, which on being touched sank to the bottom of the tube. The fluid was clear, free from smell, and presented no organisms when examined microscopically. A portion of the subsided film was removed by means of a pipette. It consisted of minute molecules and filaments held together by a slimy substance. Imbedded in the midst of these were a great number of yellow globules, microscopically not distinguishable from globules of oil. The appearance presented by the field is carefully delineated at Figure lxxii. They were unaffected by liquor potassæ, iodine, and dilute acids for some time; eventually, however, more or less granular contents became evident; no organic connection could be seen to exist between the globules and the filaments, and no animalcule of any family was present.

a portion of which was placed in a growing slide with grape-sugar.

A small portion of the film was placed upon a growing slide, and a drop of the solution of grape-sugar and phosphate of ammonia added to it, so as to ascertain whether they were spores of a fungus or the "still" condition of one of the infusoria.

Description of the growing slide devised by Dr. Maddox.

The particular growing slide used was the one devised by Dr. Maddox,—by far the best cell with which I am acquainted for purposes of this kind. A strip of tinfoil is cut into two U shaped pieces, one being larger than the other, so that when the smaller is placed upside down ∩, it will fit loosely inside the upright portion of the other. These are stuck in this position on a glass slide with a little varnish, over which a thin covering glass is so fixed that the only air or foreign matter which can reach the preparation must pass up the "chimney" thus formed between the inner margin of the larger strip of the tinfoil and the outer one of the smaller, as will be readily seen by referring to Figure lxxv.

Result of cultivation.

On the third day the globules were seen to have increased considerably in number, and on the eighth day germination was rapidly taking place (Fig. lxxiii).

A little gum water being added caused the central part to become clear and watery, and the protoplasm to shrink in the mycelium (Fig. lxxiv). Germination continued for a few days longer, but no more advanced stage could be attained.

Nothing developed in the water used.

(*d*). A test tube containing the water used in these observations was also set aside, but nothing developed in it.

Illustration II:—

Developments in more complex solutions of organic matter, viz., normal alvine discharges.

About a drachm of ordinary fæces was dissolved in an ounce of distilled water and filtered, a portion of which was placed in a watch-glass and boiled thoroughly; a drop of this was afterwards placed in an ordinary animalculæ growing slide, both being set aside under a bell-glass.

Young paramecia developed on the third day in watch-glass, which had been previously boiled;

On the second day monads and vibriones were present in great numbers in both preparations, but on the third day they had greatly diminished in number in the watch-glass, in which, however, during the night several young animalculæ belonging to the Kolpoda family (as figured at lxxx) had made their appearance.

whilst amœboid bodies appeared on the fourth day in the same solution placed in a clean animalculæ cage.

In the live-box, however, vibriones only were present as before, some of them being very long, but no Kolpodæ. On the fourth day great numbers of amœboid bodies, varying considerably in size (Fig. lxxvi, 1), multiplying very rapidly, sometimes by leaving small fragments of their substance behind (2); the portion escaping invariably from a part near the contractile vesicle, which vesicle remained bright for fifteen seconds, became puffed out suddenly, as though it had been a taper, and remained extinguished for the same period, then gradually shone again. The detached portion (3) seemed not to be merely disgorged food, for it crept about the field

Structure of the amœbæ, and their mode of multiplying.

like its parent; it also divided into two, pretty symmetrical, halves. For some time after the commencement of division, the "nucleus" is only seen in one half (4) after considerable tugging, then coming together, then separating again, each time getting a little more detached, until in the course of about two minutes the separation is complete. Frequently a mass of granules is seen to intervene, probably indigestible particles, which may adhere to either half (5), but is soon cast off, and gradually a contractile vacuole is seen to appear in the second half, which creeping along the field draws particles into its substance, and acts in every way like its parent (6).

Curious effect of adding water.

How the granular filaments in the field are produced.

Method of disappearance of the amœbæ.

Similar phenomena observed in salivary corpuscles.

On the fifth day the fluid in the slide having somewhat evaporated, a little distilled water was added, when suddenly the hitherto more or less oval amœbæ (Fig. lxxvii, 1) commenced protruding and retracting exceedingly long processes (2), which action lasted three quarters of an hour. They then became circular and still, except that the vacuole contracted (3). In another half-hour some of them commenced to creep along the field, disgorge themselves, leaving a string of granules to mark their path (Fig. lxxviii, 1); others were observed in the course of another half-hour to become circular, with a clear halo-like ring surrounding them (2), their contents being in very active motion, reminding one exceedingly of corn in a miller's hopper. This lasted for twenty minutes, when suddenly all movements ceased; the halo and vacuole disappeared, its outline became irregular and undefined (2, 3); finally, although the eye was constantly observing it, all trace disappeared, and no distinction could be observed between other molecules in the field. The remaining amœbæ seem to have undergone the same change, for when the eye was removed from the particular one described, none could be found, except a few empty-looking ones. I have frequently observed exactly similar phenomena occur in the so-called salivary corpuscles. No further change occurred in the slide, nor was there a return to the former condition during the succeeding week.

State of the solution in the watch-glass.

In the watch-glass the animalculæ continued to increase and multiply, but other kinds did not appear. The glass was held over a spirit-lamp and the liquid boiled, in order to see if out of their dead bodies others of the same or of another

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EXPLANATION OF PLATE XIX.

Illustrations of the development of low forms of life.

	FIGS.	NOS.
Amœboid bodies which appeared in a boiled and filtered solution of organic matter on the fourth day	lxxvi.	
The various forms assumed by one amœba	„	1
A portion of the substance of the amœba becomes detached	„	2
The detached portion exhibits movements	„	3
Process of division into two portions of nearly equal size	„	4
Segmentation complete	„	5
Appearance of a contractile vacuole in the detached segment	„	6
Ditto fifth day	lxxvii.	
Amœbæ	„	1
Ditto becoming stellate on the addition of water	„	2
The form subsequently assumed by No. 2	„	3
The subsequent history of the amœbæ (lxxvi—vii)	lxxviii.	
Amœbæ creeping across the field and discharging their contents	„	1
Amœbæ, which became circular, and active movement was set up among the aggregated molecules. A bright halo is seen to surround the globular mass	„	2
The halo disappears and the contractile vesicle vanishes	„	3
The mass becomes broken up altogether	„	4
Illustrating the changes which occurred in two solutions of organic matter obtained from the same source, placed on under two covering-glasses upon *one* slide	lxxix-lxxxiii.	
Circular "yeast" cells and *anguillulæ ?* which appeared in one of the preparations	lxxix.	
Developmental stages of a young *paramecium*	lxxx.	
Corpuscles developed in the midst of a heap of minute molecules	„	1
Growth of the corpuscles	„	2
A contractile vacuole becomes evident	„	3
The animalcule after its escape from the corpuscle (3)	„	4
Irregular outline assumed by the animalcule in a thick fluid	„	5-6
The animalculæ become encysted, and in this condition multiply by segmentation; some are seen to exhibit contractile vacuoles, others not	lxxxi.	

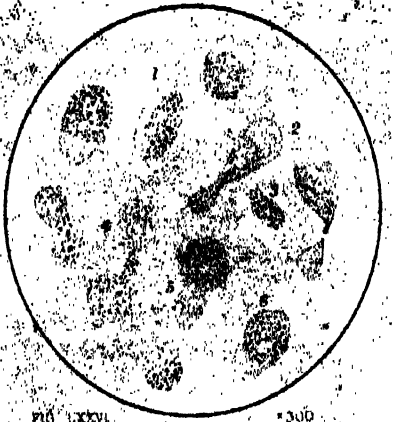


FIG. LXXVI. ×300

1. Various forms assumed by one. 2. Portions of the substance become detached. 3.4. Process of division. 5. Segmentation complete. 6. A Vacuole appears in the detached portion.

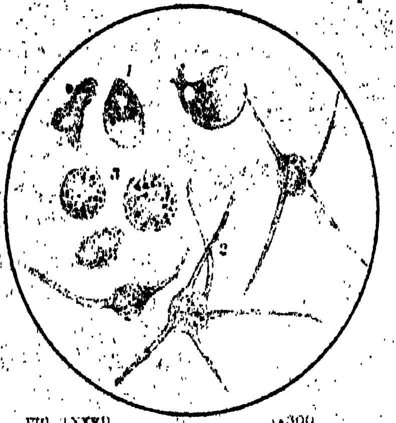


FIG. LXXVII. ×300

1. Amœbæ. 2. Becoming Stellate on addition of water, and finally circular (3).

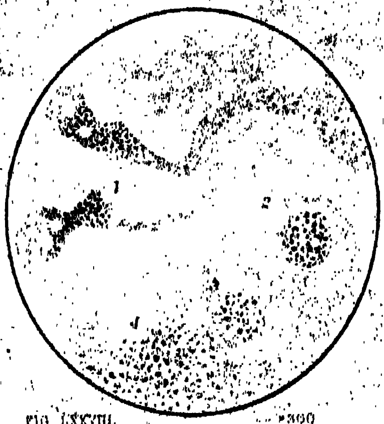


FIG. LXXVIII. ×300

1. Contents discharged as granular filaments.
2. Molecules very active. 3.4. Disappearance of Amœba

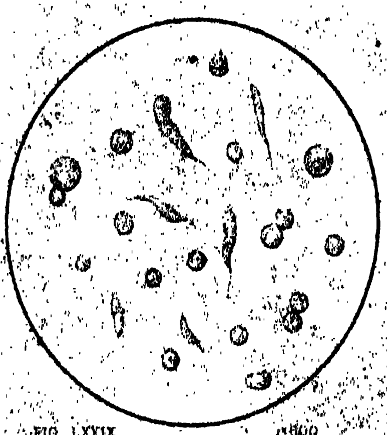


FIG. LXXIX. ×600

"Yeast cells" and Anguillulæ?

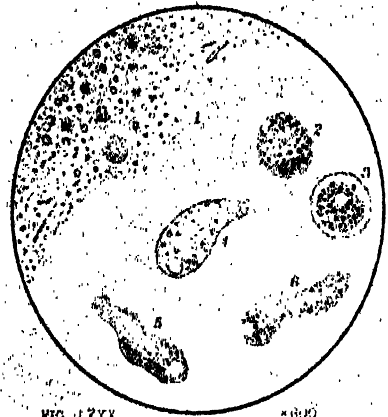


FIG. LXXX. ×300

Development of Young Paramecia
1. Corpuscles developing in the midst of a "heap"
2. Still further advanced. 3. A contractile Vesicle formed. 4. A freed Animalcule.
5.6. Irregular outline of Animalcule in thick fluid.

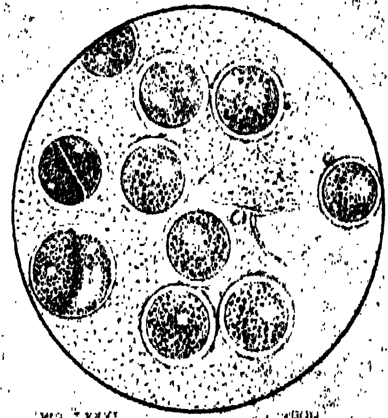


FIG. LXXXI. ×300

Encysted condition of LXXX. 4.

W. G. Lloyd Sc.

FIGS. LXXVI – LXXXI. DEVELOPED IN SOLUTIONS OF ORGANIC MATTER

[illegible] of an Inch ——— ×300

kind would appear; but none did, and at the end of a fortnight the experiment was brought to a close.

Illustration III:—

Cultivation of the ordinary stool which contained the animalculæ.

The ordinary stool, to which allusion was made at page 33 as containing such quantities of the animalculæ in the "still" and active condition, was kept under observation for six weeks.

Two preparations on one slide

A slide was taken and two minute portions were placed side by side; a distance of about half an inch intervening, and circular covering glasses applied of the same diameter.

underwent similar changes until

During the first, second, and third days the changes which occurred were alike in the two preparations. The oil globules gradually disappeared, the circular, "still" condition of the animalculæ became at first granular, ceased presenting the amœboid projections, the latter being frequently not retracted, but trailed along as the bodies rolled under the glass; the general appearance of the altered slide being represented at Figure lxiii, the earlier condition having already been described, and is figured at lxii.

The movements of the active little entozoon became more and more sluggish; at the same time it became granular and circular, and finally disappeared altogether, probably passing into the "still" condition, which also gradually disappeared. The two preparations now assumed different appearances.

he fifth day.

Filaments of oidium lactis appeared in one,

together with the little "heaps," in the midst of which yeast cells appeared.

(a). On the fifth day some fungi were seen to develop in one of the preparations, which may be designated—*a;* long filaments of oidium lactis, as figured at xxiii, commenced spreading over the entire preparation, and in the midst of the molecules (which had also undergone various stages, as already described in the first illustration) little "heaps" were forming of precisely the same microscopical characters as are given at page 40 and other places. On the sixth day a few molecules in the midst of the heap had increased in size, and on the eighth day nearly every heap was covered with yeast cells, in conjunction with very minute anguillulæ (?) (Fig. lxxix).

No further changes.

The oidium lactis disappeared entirely in the course of a few days, but no other changes took place for a month, except that the yeast cells degenerated also.

The other preparation contained no trace of fungi.

Molecular aggregation occurred on sixth day,

on which corpuscular bodies appeared next day.

A gap seems to exist between the diamater of molecules and the smaller corpuscles.

(b). The portion under the other covering glass showed no evidence of fungal development, nor yet yeast cells or anguillulæ. On the sixth day accumulations of perfectly motionless molecules had formed, especially near the edge of the glass, each heap possessing, as usual, a kind of central kernel with a more or less protoplasmic appearance; the molecules forming the peripheral part of the heap being quite as active as the molecules elsewhere. On the seventh day these heaps were crowded with cells of all sizes. Some of the molecules were larger than formerly; the greater number of the cells, however, were from about the size of a red blood-corpuscle to four times that size; the contents of the larger ones being more distinctly molecular than that of the smaller, otherwise no difference could be established between them. It is, however, particularly to be noted that the steps from the minute molecules to the smaller sized corpuscles were by no means so gradual; it did not appear as if a sufficient number of molecules of the intervening grades existed to enable one to say that the large corpuscle was simply a developed molecule. On many occasions great pains were taken in order to try and settle this question, but each time, although after the formation of heaps molecules have been seen to

Almost simultaneous appearance of the corpuscles and the animalculæ.

become, so to speak, swollen, suddenly little corpuscles appeared with undefined outline twice or three times the size of the molecules, and in a few hours the field is crowded with animalculæ. The difficulty of ascertaining this point is due to the *suddenness* with which these changes take place. After watching a certain little heap for several hours without any appreciable alteration having occurred, the eye becoming tired, it is allowed to stand unobserved for an hour or two. On returning, probably everything is changed; either the particular heap watched has become altered, or some other heap in the preparation has been more advanced and discharged the elements of life which it contained, and these animalculæ rushing about the field knock the watched little heap over, disturbing its entire geography.

The great difficulty of following out these changes.

This is precisely what occurred in the preparation now under notice. It had been watched all day in order to ascertain whether the swollen molecules would swell still more in the course of the day, but they did not, or (2) whether some of them would coalesce and form one ovum, as believed by Dr. Bennett; neither did I see this, nor could I learn that the half slimy-looking kernel surrounded by molecules had acquired a clear "nucleus" and formed *one* body, as advocated by Pouchet, for no appreciable change occurred during those twelve hours. But when examined on the next morning, twelve hours after, a great number of corpuscles or cysts were present in the midst of these "heaps," and several, what seemed to be young *paramecia*, rushed about in all directions (Fig. lxxx). Whatever it was that had taken place, it did not seem to me that one heap had given rise to only one cyst, because three, four, or more of various sizes would be seen on the surface, or what seemed to be the surface of a heap (1).

One "heap" appears to give rise to more than one cell.

I am ignorant as to what occurred between the stage of molecular aggregation and the development of the smaller sized cysts. A few of the after changes, however, were more easily followed.

Stages in the development of this animalcule.

A slow rolling kind of motion commences in the mass of granules, in the midst of which a clear space or vacuole becomes more and more distinct (2), at first non-contractile, then it suddenly goes out and does not return for two or three minutes; gradually these intervals become shortened: contraction and dilatation occurred pretty regularly at intervals of 15 seconds.

Movements of molecules in the cell, and gradual appearance of vacuole.

In a few hours it commences to spin like a top without in the least altering its position. Then it stops, its nucleus becomes extinguished, and the body appears pretty much as it did at first.

In a few hours the mass spins off-and-on, like a top.

After a shorter or longer period the action recommences, and eventually it becomes elongated, gets out of the heap into the fluid, and rushes about as if locomotion were nothing new to it. No cilia can be seen,

EXPLANATION OF PLATE XX.

	FIGS.	NOS.
A young *paramecium* getting out of the encysted condition	lxxxii.	
Two encysted *paramecia*; active movements were set up amongst molecules of the smaller one, and the cyst became detached from its fellow	"	1
The molecular contents is seen to have assumed the form of an animalcule, which, by its active movements, caused the capsule to become attenuated	"	2
The escaped animalcule	"	3
The remains of the cyst	"	4
A ruptured cyst—animalcule not escaped	lxxxiii.	1
Animalcule escaping, but is still enveloped by a delicate capsule (*schleier*).	"	2
Empty cysts	"	3-4
Segmentation into four animalcules has occurred in the cyst	"	5
After several encysting processes, a *ciliated* infusorium appeared on the slide... ...	"	6
Forms of life which developed in a cholera stool	lxxxiv.-ix.	
The animalcule described as occurring in alvine discharges in the active and in the "still" condition	lxxxiv.	
Effect of the addition of carmine solution upon the above preparation, everything in the field being tinted pretty much to the same extent	lxxxv.	
"Yeast" cells which appeared in the midst of the foregoing on the third day	lxxxvi.	
Fertile filaments bearing *Sporangia* with spores; the latter were readily distinguishable about the fourteenth day	lxxxvii.	

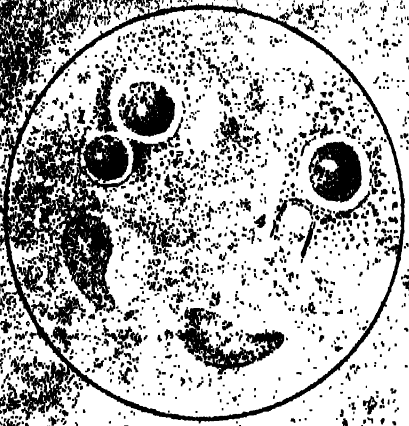


FIG. LXXXII. ×600
A young Paramecium getting out of the encysted condition.

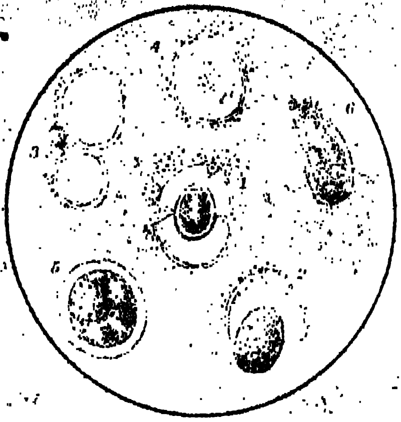


FIG. LXXXIII. ×600
1. [illegible] 2. Escaping Animalcule, 3.4. [illegible] highly developed Paramecium. 5. [illegible] containing four

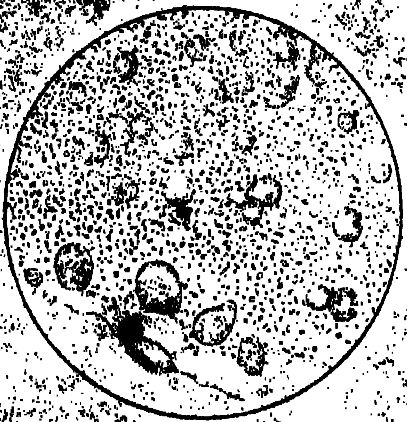


FIG. LXXXIV. ×600
Still and active condition of the Animalcule observed in Cholera stool.

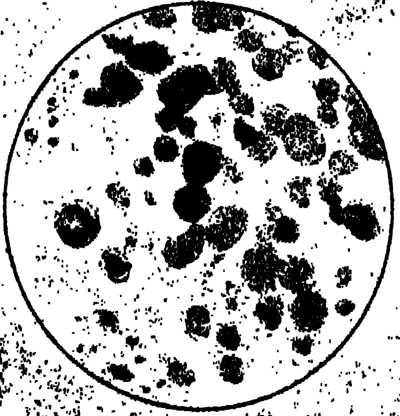


FIG. LXXXV. ×600
Carmine added to LXXXIV.

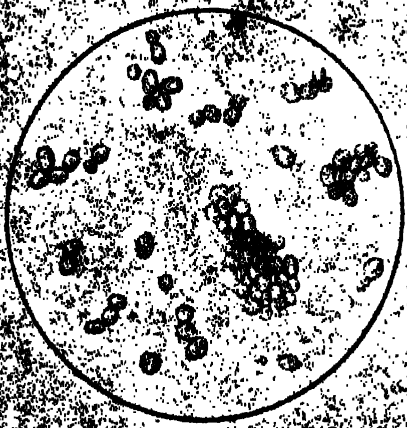


FIG. LXXXVI. ×600
Yeast cells.

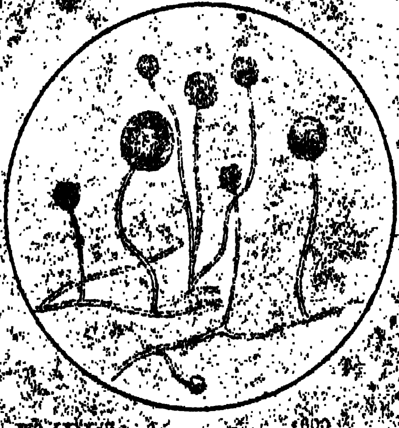


FIG. LXXXVII. ×600
Developed in Cholera stool.

FIGS. LXXXII-LXXXVII. DEVELOPMENTS IN ORGANIC SOLUTIONS.

×600

Contents escape as a non-ciliated infusorium;

after a time it becomes encysted.

Movements of molecules recommenced.

nor any trace of nucleus, merely a contractile vesicle at the broader posterior end, with granules and molecules universally distributed (3). In those parts of the field where the fluid is rather thick, it creeps along something after the manner of an amœba (4). On the next day, the eighth, several were seen to move very slowly and to become circular and still. They became surrounded by a clear hyaline capsule, and the vacuole again disappeared. A few hours after this the field presented the appearance shown at Figure lxxxi. Some were perfectly still, and had no contractile vacuole; in others the molecular contents showed active movements, with or without a vacuole; in some two vacuoles were visible, not contracting simultaneously, and in such cases there seemed to be two centres of movement—two irregular masses seemed to move within the cyst. The evidence of division was frequently more marked, a regular line of separation existing, and in others two oval bodies are seen to revolve within the capsule. In the drawing the remains of two cysts are also evident. In order to know exactly the phenomena associated with the escape of the animalculæ, the pair delineated at Figure lxxxii, 1, were selected and continuously watched.

The escape out of the cyst.

Movement of molecules followed by rupture of cyst.

Escape of infusorium enclosed in a sac,

which after a time gives way, and the animalcule is free.

A rolling movement commenced among the molecules of the smaller one, which increased, until at last each molecule seemed to dance past the other. The vacuole went and came rapidly, lasting about six seconds, and in the course of another six seconds returned, then became perfectly still; movement recommenced and stopped in the same way. Thus it acted for some time; each time, however, the outline of the contents became more evident, and the cyst became more and more distended, finally ruptured (2), and the body rolled out. It was evidently not yet free, and its outline was indistinct. Very active movements were now set up, pseudopoda pushed out in every direction, and it was seen to be still surrounded by a very delicate sac. By continually turning itself about, this film became much distended, and so transparent that its form was distinctly visible (3). At last the pellicle became so attenuated that it escaped without trouble (4). The same process takes place when the animalcule has divided into two or four.

The encysting process repeated many times; segmentation into two or four may or may not take place during each encysting process.

In the encysting process which follows, the cysts seem to become thicker, and a little fluid is frequently seen between the inner lining of the cyst and the delicate sac* which surrounds the animalcule. Frequently such cysts are seen to have become ruptured some time before the escape of the contents (Fig. lxxxiii, 1), and it not seldom happens that the latter after its escape does not rupture the thin inner capsule (2), but remains perfectly quiet for two or three hours. Old cysts persist for some days after being forsaken by the infusoria (3), and not infrequently the latter has left a few granules to mark its former abode (4); two or three may also develop in these thicker kinds of cysts. The size of the cyst bears no positive relation to the number of bodies it may contain; a comparatively small cyst may contain four embryos, allowing of active movements, as existed in the one delineated at 5.

In the course of a month cilia and a nucleus evident.

At the end of a month numbers were seen distinctly ciliated; a nucleus became developed, as well as a contractile vacuole, and a current was established at the anterior portion of its body, so that particles were drawn towards it (6).

---

* This, according to some writers, is the "cyst," outside which is the "cell," surrounded by the hyaline gelatinous "veil"—(*schleier*).

Illustration IV:—

Developments in cholera stool.

Its early condition.

The fresh dejection of a cholera patient was examined almost immediately. The sediment was found to be composed of a slimy substance dotted with granules and molecules, intermixed with a great number of more or less circular bodies, some hyaline, some granular, many of which appeared to me to be the still condition of animalculæ, as already alluded to, together with several euglena-like bodies, disporting themselves in the more fluid part of the field. A careful sketch of these objects is given at Figure lxxxiv. There were plenty of monads and bacteria in the field, but the vibriones were exceedingly small and short.

Effect of carmine solution.

A solution of carmine in glycerine after prolonged action seemed to stain everything in the field to the same extent; the varying density of the colour seemed to depend entirely on the thickness of the layer; that is, a larger amount of colouring matter was present when the layer was thick (Fig. lxxxv).

Evacuation placed in growing slide.

(a.) A minute quantity of this stool was placed in the Maddox growing slide already described. During the first two days the objects became more and more disintegrated, until on the third day not a trace existed of the circular bodies and animalculæ previously existing.

On the fourth day a few creamy-looking spots were seen at the edge of the preparation, consisting of innumerable molecules (monads) manifesting very *great activity*, together with some short vibriones.

Disappearance of the corpuscles, &c., and formation of a white margin by the fifth day.

This condition had increased greatly by the next day, the creamy appearance having extended to the entire margin of the fluid, to the extent indicated by the dark outline of the preparation in the figure of the Maddox slide at lxxv.

Nature of this white margin.

In the midst of these molecules little *heaps* were seen to form, in which no motion was evident, nor yet any definite structure, but amorphous granules, around which, and above and below, myriads of monads and short vibriones played. Some slight distance from the margin an opaque line, consisting of unusually active monads, was seen separating the creamy ring into an inner and outer portion, but no distinction could be observed between the appearance of the molecules of one side from that of the other, except that in the outer the *heaps* were more plentiful.

The monads, &c., in the central clear space had become perfectly still, and no *heaps* had formed amongst them; towards evening the line seemed to have spread on either side, as the whole creamy ring became as thickly studded with molecules—consequently opaque—as the narrow line was in the morning. The circular cells seem to have disappeared altogether.

Some molecules near the "heaps" enlarged.

On the sixth day not a single molecule quivered. The creaminess of the margin had slightly diminished, but the "heaps" were still present, rather more slimy-looking, not so regularly circular, but frequently elongated and straggling. The diameter of some of the molecules in contact with the mass had increased.

but a fungus crept in and spoilt the preparation.

A mycelial filament was now seen to insinuate itself from without into the preparation, having crept up the "chimney" of the growing slide, and the further development in or about the heaps came to a stand-still, although watched for a month. The mycelium spread in every direction, and gave rise to yeast cells.

EXPLANATION OF PLATE XXI.

Fungi developed in cholera discharge.

	FIGS.	NOS.
Earlier condition of lxxxvii: the filaments are intersected by those of Penicillium ...	lxxxviii.	
Penicillium viride	"	1
Penicillium glaucum	"	2
A more fully developed specimen of lxxxvii. Some of the filaments are seen to present dilatations or *macroconidia*	lxxxix.	

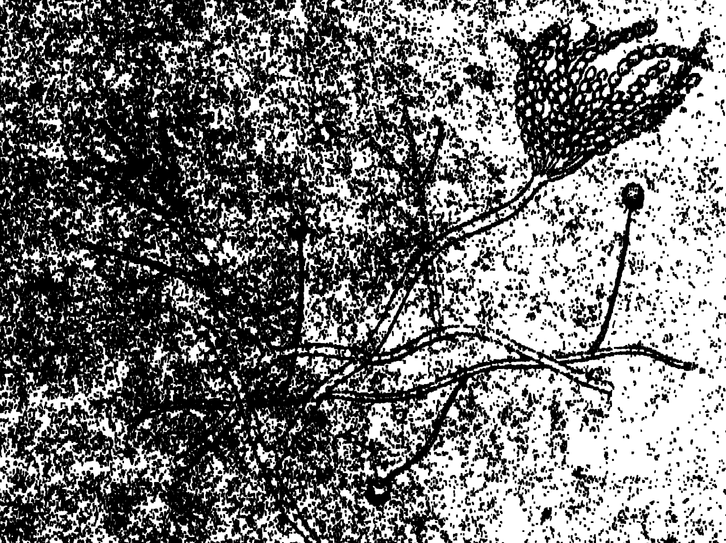
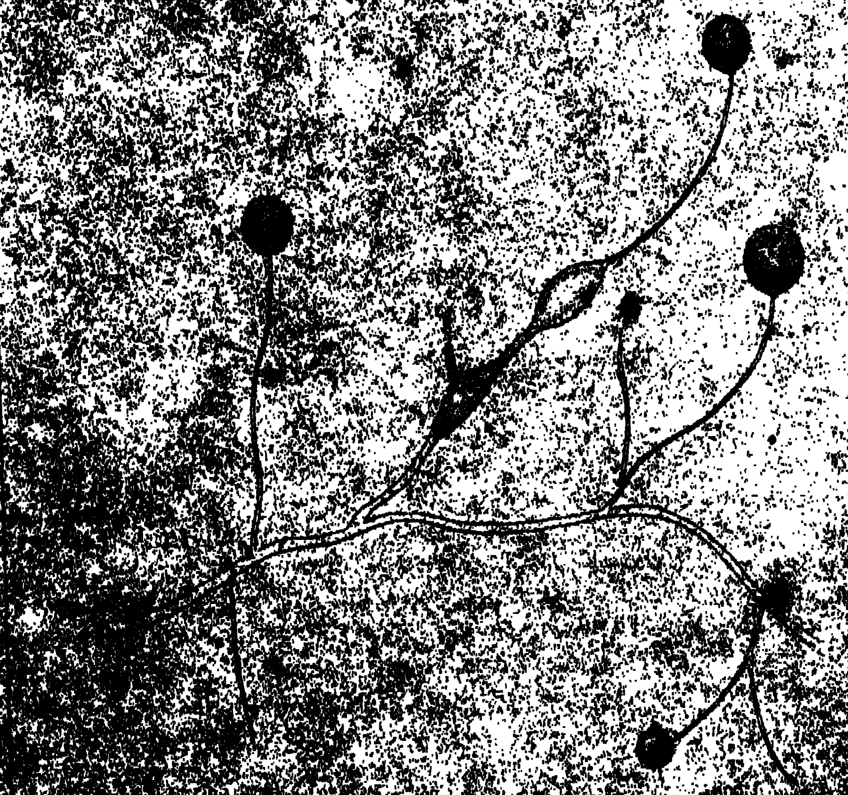


Fig. [illegible] [illegible] ×600



[illegible]

[illegible] IN CHOLERA STOOL

Slide prepared as last with addition of cultivating fluid developed penicillium.

(b). A similar slide containing a drop of this stool, to which a little of the growing solution of grape-sugar and phosphates was added, went through the same stages as the foregoing, and developed into *penicillium*, as in Figure xix, 2.

A similar preparation without a covering glass

produced penicillium associated with a mucor-like form of fructification.

Acid reaction of preparation.

(c). A portion of the same preparation without a covering glass was preserved in a moist chamber. On the third day a white speck was seen in the surface consisting of innumerable "yeast" cells (Fig. lxxxvi), with some filaments branching in all directions. On the fourth day tufts of *penicillium* had developed—two varieties (Fig. lxxxviii)—*P. Glaucum* (1), and *P. Viride* (2). This continued until the ninth day, when a few of the filaments springing up in the midst of the *penicillium* were tipped with a dewdroplike dilatation excessively delicate—a mere distended pellicle. In some cases they seemed to be derived from the same filament as others bearing the ordinary branching spores of *penicillium*, but of this I could not be positive. This kind of fructification increased rapidly, and on the fourteenth day *spores* had undoubtedly developed within the pellicle (Fig. lxxxvii), just as had been observed in a previous cultivation (page 13), precisely similar revolving movements being also manifested. The reaction of the liquid portion in the cell was slightly acid, and became very much more so in the course of a month. No further change took place, except that the capsules became rather thicker, but never so resistent as to withstand the action of a drop of water, spores being instantaneously set free by it.

Seeming germination of the enclosed sporules.

In not a few cases a chain of spores, or sometimes delicate filaments, seemed to escape from these cysts, as if the spores within had germinated; which indeed must have been the case, unless they had fallen from a tuft of penicillium and adhered to the capsule. In other cases dilatations (macro-conidia) appeared in the filaments, and even from these a chain of spores was occasionally seen (Fig. lxxxix).*

(d.) A small portion of the evacuation was placed on an ordinary slide with a covering glass. It went through the same process as was described in connection with Maddox's slide (*a*), and eventually yeast cells were produced as at Figure lxxxvi, but nothing further.

A preparation like the foregoing placed apparently under the same conditions

produced young paramecia.

(e.) A similar slide placed in the same moist chamber presented similar changes as the foregoing for the first four days. It was not examined on the fifth, but when placed under the microscope on the sixth day, representatives of the *kolpoda* family, both active and encysted, had made their appearance in great abundance; the various stages in their subsequent development corresponding precisely with what has already been described in connection with experiments on ordinary excreta.

Experiments conducted with other substances.

In some cases the admitted air had first to pass through a heated tube.

Serous fluid, blood, and urine, from persons affected with cholera, as well as from other persons, have been in like manner subjected to systematic and continuous observations, the air in some of the experiments having been made to pass through a red-hot tube before its entrance into the chamber in which substances under examination had been placed, as adopted by Professor Tyndall, in order to destroy the minute *atomes* of organic matter which, according to this gentleman's researches, will pass through sulphuric acid or caustic potash undestroyed. The particulars of these observations

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Probable connection between *penicillium* and *mucor*.

* In connection with the appearance of this mucor-like fructification in such intimate connection with penicillium on this and on other occasions, although merely an approach to the "cholera fungus" of Hallier—a fructification resembling it much more closely, if not identical with it, having been obtained under like circumstances from ordinary excreta—it must be allowed that it speaks very strongly in favour of the view so firmly advocated by this mycologist of a generic connection between *penicillium* and *mucor*.

are reserved for the present, the results being such that no benefit could be attained by giving them in detail. It is nevertheless hoped that the foregoing illustrations will sufficiently explain the methods adopted in investigating the subject of this section. The description of the changes which occurred during the cultivations has been condensed as much as possible; more so than would be allowable, were they intended to establish any particular fact.

Statement of results postponed.

Lesson to be derived from the last series of illustrations.

A not unimportant lesson is, however, conveyed by even the comparatively few experiments which have been conducted, namely, that, in spite of more than ordinary care, very different forms of life will make their appearance in substances which are derived from the same source under conditions which *seem* to be identical, and that too in very simple mixtures. Consequently, the greatest caution must be exercised in estimating the importance or otherwise of any peculiar manifestations of vitality which may be observed in substances associated with disease.

Summary of conclusions drawn from all the observations.

The results of the investigations referred to in this report may be thus summarised:—

"Cysts."

1. That no "cysts" exist in choleraic discharges which are not found under other conditions;

Sporangia.

2. That cysts or "sporangia" of fungi are but very rarely found under any circumstances in alvine discharges;

Special fungus.

3. That no special fungus has been developed in cholera stools, the fungus described by Hallier being certainly not confined to such stools;

Animalculæ.

4. That the still and active conditions of the observed animalculæ are not peculiar to this disease, but may be developed in nitrogenous material even outside the body;

The flocculent deposit, and Parkes' "peculiar corpuscles" not composed of epithelium.

5. That the flakes and corpuscles in rice-water stools do not consist of epithelium, nor of its *débris*, but that their formation appears to depend upon the effusion of blood-plasma; and that the "peculiar bodies" of Parkes found therewith correspond very closely in their microscopic and chemical characters, as well as in their manifestations of vitality, to the corpuscles which are known to form in such fluid; these are generally, to a greater or less degree, associated with blood-cells, even when the presence of such is not suspected, especially as the disease tends towards a fatal termination, when the latter have been frequently seen to replace the former altogether; and

The appearance and amount of vibriones, &c., not exceptional, but may be so in their nature.

6. That no sufficient evidence exists for considering that vibriones, and such like organisms, prevail to a greater extent in the discharges from persons affected with cholera, than in the discharges of other persons, diseased or healthy; but that the vibriones, bacteria, and monads (micrococcus) may not be *peculiar in their nature*, for these *do* vary, may not be the product of a peculiar combination of circumstances, and able to give origin to peculiar phenomena in a predisposed person, is not proven.

Conclusion of Part I.

In bringing this part of the report to a close, I wish to express my sincere thanks to Dr. John Murray, Inspector General of Hospitals, Indian Medical Department, who has, week by week, watched the progress of these experiments, and given such practical advice and assistance as his long study of the subject peculiarly enables him to do. I also desire to tender my thanks to Dr. Brougham of the Presidency General Hospital, and to Dr. Baillie of the Chandney Hospital for the facilities which were placed at my disposal for obtaining the *matériel* requisite for these examinations; as well as to Dr. Norman Chevers, Principal of the Medical College, for permission to make use of his private library, as well as the library attached to the College.

PART II.

REMARKS REGARDING THE SOIL, &c., OF CERTAIN PLACES IN RELATION TO PETTENKOFER'S THEORY OF THE CONNECTION OF CHOLERA WITH THE VARIATION IN THE LEVEL OF THE SUBSOIL WATER.

SEEING that Professor Pettenkofer's observations extend over a period of 16 years, during which constant observations have been taken by him of the water-level in various parts of Munich and elsewhere, it will be at once evident that the short period which has elapsed since the commencement of this investigation in India cannot enable one to have formed but most indefinite conclusions on the subject. Accustomed as the Bavarian Health Officer has been for many years to much deep thinking on the subject, it is frequently difficult for less trained intellects to follow his exact meaning on all points, as the theory is by no means so simple that "he who runs may read."

During the last year a work* was issued by him embodying the result of the labours of previous years, in which the views already advanced are maintained with even a greater conviction of their truth than before.

The principal features in Pettenkofer's theory.

The main points in the theory are—(1) there exists a specific cholera poison, which (2) reaching the soil undergoes various stages of development, providing (3) that a certain amount of moisture is present; (4) should the ground not possess the requisite amount of moisture, be either too dry or too wet when the poison is placed therein, the latter will retain its vigour until the requisite conditions return; but (5) these having returned, it does not follow that an epidemic will forthwith break out, unless (6) certain meteorological conditions are present (the precise nature of which is unknown), and especially there must be (7) a predisposition to the disease in persons coming within the area in which the poison is found.

The season during which cholera is worst in Lower Bengal does not correspond with worst period in the Upper Provinces.

The reason why the period when cholera usually breaks out in the Upper Provinces does not correspond with the period in which it is at its height in Calcutta and in Lower Bengal generally, is, according to Dr. Pettenkofer, due to the fact that in the former place the ground for the greater part of the year is too dry, there being no rain, and the water being commonly many feet from the surface; whereas in Lower Bengal when the rains set in cholera ceases—the ground becomes too wet. Cholera is worst in the latter when the water-level is at its lowest, namely, about April; whereas in the former cholera is at its worst when the water-level is rising or about subsiding (August and September), so that, I presume, the Munich Professor would explain the reason why cholera is endemic in Bengal, and only epidemic in the Upper Provinces by the fact that the wet season is much shorter in its duration than the dry, consequently the conditions necessary for the development of the poison occur only during short periods, whereas the same conditions affect Lower Bengal in a different way, giving rise to short periods of exemption, instead of the short periods of attack, consequently the inhabitants of the "Ditch" are more exempt from cholera when it overflows with water.

During the rains it is too wet for the development of the poison in Bengal, and at other times it is too dry in the Upper Provinces.

It must also be borne in mind that a local fall of rain is not in all cases the only cause of variation in the height of subsoil water, for an adjoining river may rise or fall, irrespective of local conditions, and perhaps give rise to an alteration in the amount of moisture present in the soil. In a great number of instances, however, the level of the water in a well adjoining a river is considerably above that of the river, as a non-porous, clayey layer may dip towards it, thus confining the water to its bed. Again, heavy falls of rain on distant hills may affect the level of the water in the plains, should an impermeable stratum extend from the one to the other, over which water might flow. These and many other such facts connected with the geology and the topography of a place must be carefully considered before any opinion can be formed of the correctness of the views advanced by this distinguished Professor.

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* "Boden und Grundwasser in ihren Beziehungen zu Cholera und Typhus." Von Max v. Pettenkofer. München, 1869.

Local rainfall not always a true criterion of the amount of soil moisture.

It will be seen from the foregoing that the poison is considered not to *develop* in water, which is contrary to the commonly received opinion, nor does it multiply to an appreciable extent in the intestinal canal, the human body being merely the *stage* upon which this actor plays its part. The poison requires a special *nidus* in which to multiply and to develop into infecting matter. This Pettenkofer traces to the soil, especially to alluvial soil, which, being so exceedingly porous, allows free interchange between the air in its interstices and the air above, as well as being subject to a great variation in the amount of water which it contains.

The cholera-germ does not develop in water, nor in the human body,

but in the soil.

Whilst marking out on a map the places suffering from cholera, he was particularly struck with the predisposition it seemed to manifest for following the natural water-courses of the country, rather than the usual routes of traffic. In the former, the places of attack were pretty regularly situated, whilst along the roads for intercommunication, the affected places show great irregularity, cholera spreading only in those parts in which the soil was of an alluvial nature, although quite as many opportunities existed for the dissemination of the poison by means of intercourse in the places never attacked as in the less fortunate localities.

Tendency of cholera to attack places situated along rivers.

The cholera-germ, as described by Pettenkofer, may be defined as a specific *leaven*, requiring earth, consisting of organic matter and salts, with a certain amount of water for its development to infectious matter, just as other ferments require certain special substrata and moisture before it manifests its action. If ordinary leaven be added to sand no action takes place; if it be added to dry flour, it does not spread beyond the immediate vicinity in which it was placed; but if the flour be moistened, "the little leaven leaveneth the whole."

The cholera-germ supposed to be of the nature of a ferment.

The question naturally occurs—By what means does it get into the human body after being thus developed in the earth? To this Pettenkofer replies: There are two ways by which substances may arise from the ground, even from a great depth:—

The poison may be disseminated in two ways, viz.,—

By means of (1) the water, and by means of (2) the air contained in its interstices.

water and air.

Numerous illustrations may be produced of the possibility of substances, perceptible to the olfactory nerve, making their way upwards from considerable depths, such as when a sewer bursts, or an escape occurs in a gas-pipe. Frequently this fact is not observed where the mischief has taken place, but in a house, perhaps, some distance from it, the warmth of which, should it not stand on an impervious layer, attracts the disengaged matter like a chimney, and the house acts as an escape-pipe for a noxious gas. Were it ever conclusively shown that cholera depended upon some

Possibility of the air becoming contaminated by substances rising from below.

Tendency of foul air to enter heated rooms with permeable floors.

fermenting process taking place in the ground, which had been originated by some of the poisonous material being placed in a soil adapted for its development, it would follow that in India large substantial buildings would be safest by day, being cooler than it is without; but, unless the flooring were made impervious to air, it would be the most unfavourable at night, being warmer, consequently the native's hut approximating more closely to the temperature of the air ought to be more exempt from cholera.

Water, a vehicle for the dissemination of cholera.

Although cholera is not considered to acquire its property of infection by being developed in water, still water as well as air may act as a vehicle conveying the infectious matter from the ground, consequently this theory in no way affects the importance to be attached to the value of obtaining water from a pure source; indeed it speaks very strongly in favour of obtaining it from places as far removed as possible from human habitations.

Buchanan's explanation of Pettenkofer's theory.

Particular attention has been drawn to this subject very lately* by Dr. Buchanan, one of the several distinguished Sanitary Officers whom Mr. Simon has gathered around him at the Public Health Department of the Privy Council. While allowing that there is a connection between the disease and the level of the water in the wells, Dr. Buchanan maintains that the mischief *is in the well itself;* because "it is precisely at the period when soil water is sinking that wells sunk in porous soil must, if ever, furnish impure supplies. A well in porous soil gets its water in two ways; water stands in it up to the level of the soil, and also drains into it from every source (from rain, from slops, from cess-pools) on a higher level than that of the water of the soil for many yards around. In other words, besides receiving water from the general waterflow through the soil, it receives the local soil water, soaking from a cone of ground of which the surface of water in the well is the apex. Let the level of water in the soil be high, and the base of this cone is small; let the level of the soil water be low, and the base of this cone (at the surface of the ground) is large. In either case the saturated soil is comparatively impervious to more water, and approaches the condition of a non-porous stratum. When the soil water is at its highest therefore, impure slops and excrement that may be on or in the ground tend to run horizontally away. When the soil water on the contrary is low, such matters tend to soak downwards."

The deeper the well, the greater the area of surface pollution which is likely to get into it.

It will be observed that Dr. Buchanan testifies to the matter-of-fact portion of Pettenkofer's statement, namely, the connection of certain diseases with the level of the soil water, but explains this connection in a different way. Buchanan produces very remarkable illustrations in proof of his statements, which will certainly be borne in mind whilst investigating this subject in India. The possibility of the foregoing being the true explanation of the connection between cholera and the level of the soil water had not escaped Pettenkofer, as he states that examinations have been made of the quality of water which is sinking, and the results were by no means unfavourable—in some cases the water was even found to be more pure. As far as the tanks in Calcutta are concerned, I cannot bear testimony to the observations of Pettenkofer in this matter, because the percentage of organic matter has been greater when the tanks were low than when in the contrary condition; concerning the quality of water in deep wells at various heights, I possess no data.

The quality of water when wells are low.

The foregoing remarks will, I trust, be found to present a tolerably clear exposition of the theory concerning the relation said to exist between the spread of cholera and the state of the ground water.

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* *Medical Times and Gazette*, 1870.

I now proceed, in as few words as possible, to give an account of my visit to the places affected with cholera in the North-Western Provinces during the severe epidemic of last autumn.

ALLAHABAD.

Arrival at Allahabad.

I arrived at Allahabad towards the end of August, in accordance with the instructions I had received, in order to accompany the Sanitary Commissioner with the Government of India in his tour through the cholera affected districts, and thus be able to avail myself of his advice and direction.

Seeing that our visits to the various places, to be hereafter alluded to, were necessarily of short duration, it was impossible for me to obtain more than a very superficial knowledge of the geography of a place extending over such a wide area as Allahabad does.

Relation of Allahabad to rivers.

Situated in the angle formed by the junction of two rivers, the Ganges and Jumna, it was thought not improbable that the high or low condition of these rivers might materially affect the level of water in the wells, seeing that many acres of land are swamped during the rains, the station being almost surrounded by water, as a glance at the accompanying map will show.

The level of the subsoil water nearly 30 feet below that of the Jumna.

This, however, was ascertained by Dr. Bow not to be the case, at least as far as the Jumna was concerned, the water in the wells being nearly 30 feet below the level of the surface of the Jumna.

Extent of variation of level.

The wells not affected by the rivers.

Condition of soil chiefly affected by the rainfall.

The average depth of the wells from the surface, as examined by Dr. Chalmers and myself, was found to be from 50 to 65 feet. The average variation in the level of the water between the dry and the wet season is about 10 feet, whereas the Jumna varies to the extent of 30 feet or more under ordinary circumstances; nor does the alteration in the water-level of the one correspond with the variation in the other, and a consecutive fall of rain of 12 inches will not raise the level of the water to a corresponding extent; a great portion, doubtless, finding its way into the river before getting into wells, especially after the first falls of rain, when the ground does not permit of such free percolation. It cannot, therefore, be said that the amount of subsoil water at Allahabad is materially affected by the rivers which bound it on either side; nor will it be safe to judge of the extent of moisture present in the subsoil by the registration of the well water alone; the *rainfall* must also be taken into account, as the latter at Allahabad appears to influence the condition of the soil more than the permanent subsoil water.

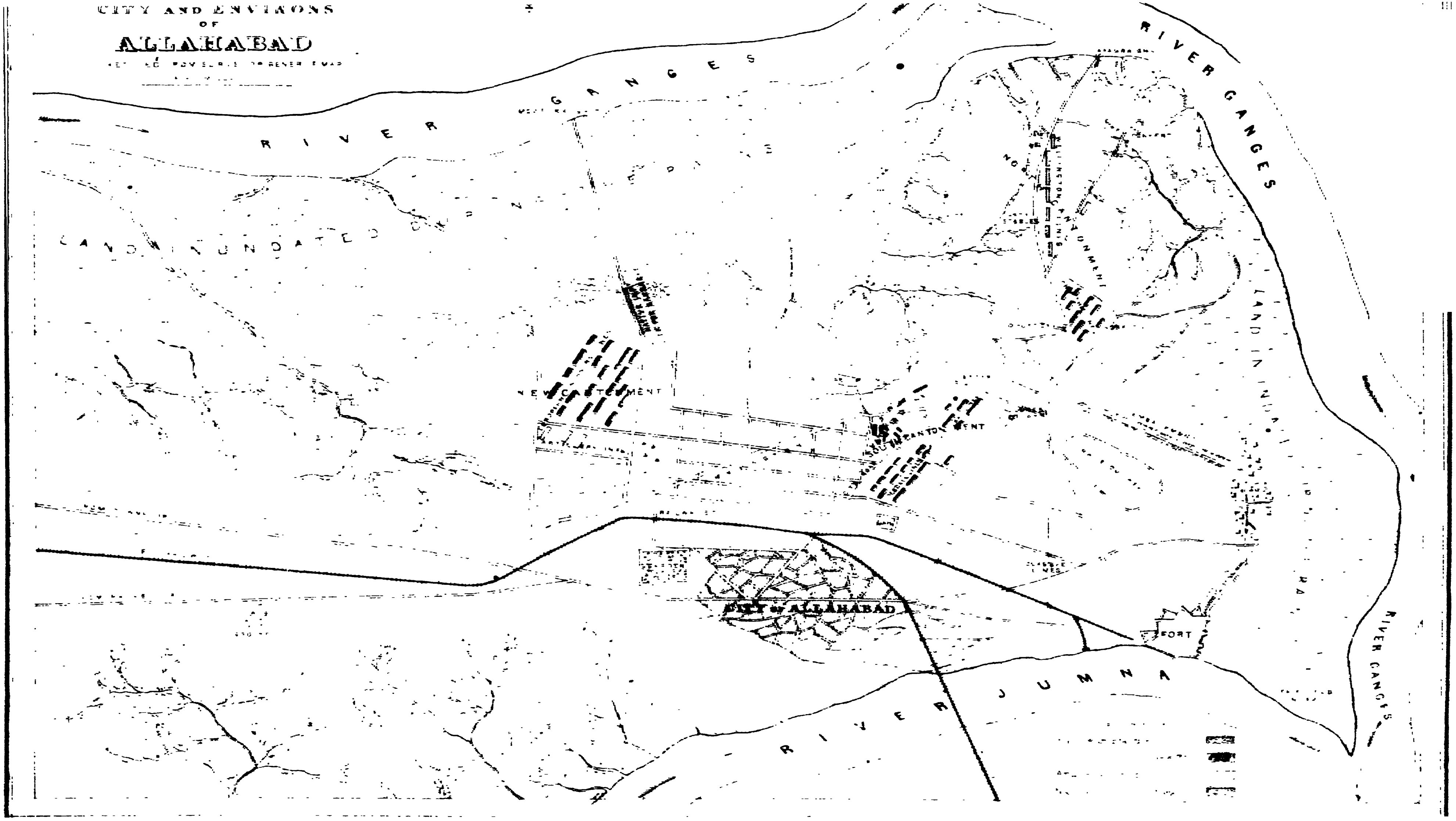
The soil here is of a sandy, clayey nature, intermixed with layers of kunkur.

Porous nature of the soil.

In the hot weather extensive fissures are to be observed everywhere in the ground extending to great depths, and exceedingly permeable to water. On subsequent examination, it was found, when dried in the sun, to be solid to the extent of one-half, the other half being interstices filled with air.

Cholera said to affect some barracks more than others.

In order to have a more precise knowledge of the extent of the porosity of the soil upon which the various barracks have been built, and which are said to vary in the degree of their liability to cholera, although in other respects apparently as like one another as it is possible for buildings to be, and the sojourners therein subject to precisely the same influences as regards food, clothing, and water, it was thought that perhaps some clue could be obtained by ascertaining the extent to which the soil beneath the buildings was permeable to the air below. General Travers, v. c., immediately permitted samples of this soil to be obtained, which on my return to Calcutta were subjected to the following treatment:—A little of it was reduced to moderately fine powder


CITY AND ENVIRONS
OF
ALLAHABAD
RIVER GANGES
RIVER GANGES
RIVER GANGES
LAND INUNDATED
LAND IN INDA
CANTONMENT
WELLINGTON LINES
NEW CANTONMENT
CANTONMENT
CITY OF ALLAHABAD
FORT
RIVER JUMNA

in a mortar and placed in the sun until thoroughly dry. In the meanwhile, two *burettes* were fixed on to a stand, the lower portion or point of one being connected to that of the other by means of a piece of India-rubber tubing supplied with a clip, so as to be able at will to interrupt the connection between the two tubes. A given quantity of soil (100 cubic centimeters) was carefully placed in one *burette*, and a similar amount of water in the other. The latter was allowed to flow into the former, which, as it ascended in the tube containing the soil, was seen to drive out the air existing in the interstices, the amount of air displaced corresponding to the amount of water which entered. When the water came up to the upper edge of the soil in the tube, the connection between the tubes was interrupted, and the amount of water used read off.

Method of ascertaining the porosity of soils.

As a few of the particulars of these observations may be useful for comparison when more exact data shall have been obtained of the relative liability of the barracks in question to cholera, I append them in a tabulated form:—

Result of experiments.

	Soil at a depth of 4 feet from	Amount of *air* contained in 100 parts by measure.	Permanganate solution required to give a permanent tint to a solution of 1 oz. soil, 10ozs. water requiring 4 decems of the same solution.
Allahabad.	Clydesdale Lines, No. 8, south end	50·	5 decems
	„ „ „ 8, north „	46·4	4 do.
	„ „ „ 3, south „	53·3	8 do.
	„ „ „ 3, north „	50·	... ..
	Chatham Lines, No. 8	50·	5 decems
	Artillery Lines, No. 2	50·	4 do.
	Wellington Lines	16·4	6 do.
	New Cantonment Barrack, No. 3	46·4	4 do.
	Jail...	53·3	5 do.

Six of the specimens were subjected to chemical examination with the view of ascertaining whether the soil near the barracks, at or about three feet from the surface, contained an unusual amount of organic matter or not. One ounce of soil was taken and allowed to stand for twelve hours in pure water, shaking it a few times during this interval; it was then filtered, and the clear solution examined in the manner usually adopted for the examination of water.

Chemical examination of the soil.

The results were pretty much the same in all cases; except in those where the soil had been a "made" one, the amount of lime-salts varied, but I was surprised to find that the soluble organic matter, as estimated by a standard solution of *permanganate of potash*, did not much exceed the amount present in the ordinary drinking water of Calcutta when estimated by the same solution. (The exact relative amount of organic matter present may be ascertained by reference to the foregoing table). From these observations, therefore, I infer that in the ground beneath and about the barracks at Allahabad, both in the old *and* new cantonments, the amount of oxidisable matter was not in excess, at a comparatively short distance from the surface, at the time when cholera visited that station; consequently the epidemic could not have been owing to putrefying matter in the soil of the cantonments, unless such matter had been washed into the wells by the rain, and thus infected nearly a hundred and fifty persons belonging to the

Amount of organic matter in the soil was not excessive.

Inference.

European troops stationed there. To have produced this, the amount of surface pollution present before the rains set in must, I should imagine, have been very extensive indeed.

Microscopic examination of the soil.

On the third day ordinary infusoria appeared.

It was also thought desirable that a few samples of the earth should be taken and moistened with water in order to ascertain whether any special form of life, animal or vegetable, would make its appearance. I select two examples. A small portion of dry-earth from the new cantonment was placed in a test tube, to which a little water was added, sufficient to cover it. During the first and second days no particular forms of life were observed, but on the third and succeeding days several minute infusoria had become revived, and presented exceedingly active movements (Fig. xc).

A similar portion of soil from the Clydesdale Lines was treated in the same way.

In another sample the animalculæ found in evacuations were plentiful.

In it also no particular objects were manifest for the first two or three days, but towards the end of a week, in addition to the objects delineated in the last figure, bodies in the circular, still, and active condition—not in any way distinguishable from the animalculæ already described as occurring in choleraic and other discharges—were seen to have developed in great numbers, some freely moving in the fluid, and others imbedded in granular matter (Fig. xci). Nothing further was observed in any of the samples, nor could I detect any evidence of the existence of the ultimate elements of fungi.

Visited the cholera-camps, the native portion of the city and surrounding villages.

I also accompanied the Sanitary Commissioner to the "cholera-camps" occupied by the 58th Regiment, about fifty miles from Allahabad, on the Jubbulpore road; and Dr. Chalmers, the Deputy Inspector General of Hospitals, very kindly undertook to show me nearly every part of the city and cantonment. To Dr. Irving also I am indebted for similar help. These excursions were undertaken more with the intention of getting a fair insight into the geography of the place, than of ascertaining what the exact sanitary arrangements were,—to report upon which not being the object of my visit. Careful notes, however, have been taken of what was seen and heard concerning the outbreak of the epidemic, but their narration would unnecessarily prolong this report and answer no good purpose. I hope, however, on a future occasion to turn what I then learnt to account.

CAWNPORE.

Visit to Cawnpore.

On the way to Lucknow, a few days were spent at Cawnpore. Compared to Allahabad, the troops in this station had suffered very little. Dr. Bryden states that the admissions were 27 and the deaths 17.

Explanation of Plate XXII.

	FIGS.	NOS.
Objects observed in some moistened soil from Allahabad on the third and succeeding days ...	xc.-xci.	
Various stages of *Monas lens* principally; observed in soil at a depth of four feet from the immediate vicinity of the newly erected barracks	xc.	1-8
Minute Zoospores, together with animalculæ in the "still" and active condition, precisely similar to those described as being present in alvine discharges. Developed in moistened soil obtained from the flooring of the Clydesdale Barracks at a depth of four feet.	xci.	
Developed in moistened soil from Lucknow	xcii.-iii.	
Panophrys in two positions	,,	1-2
Euglenæ or *Astasiæ*	,,	3-4-6
Amphileptus	,,	5
Two *Moners* are shown in the act of creeping across the field. One is seen to curve its Pseudopoda around the circular cells present the encysted condition of some animalcule. A ciliated infusorium may also be observed in the figure...	xciii.	
Developed in moistened soil from Fyzabad	xciv.	
Zoosporoids	,,	1-2
Monas lens	,,	3
Paramecium (?)	,,	4
Coleps hirtus	,,	5
Developed in moistened soil from Meerut	xcv.-xcvi.	
Algæ	xcv.	1-2
Monas lens undergoing segmentation	,,	3-7

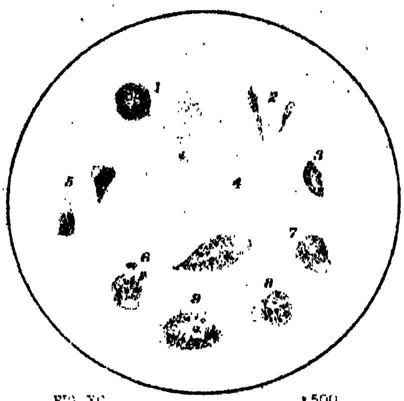


FIG. XC ×500
1. 8. Various stages of Monas lens
9. Young Paramecium

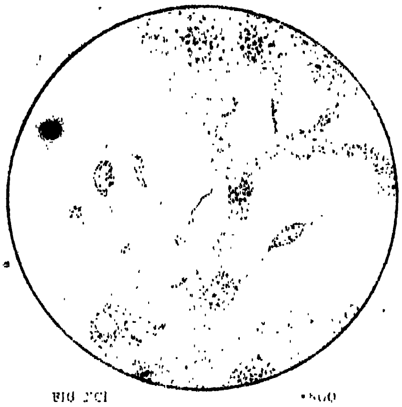


FIG. XCI ×500
Zoosporoids and Astasia

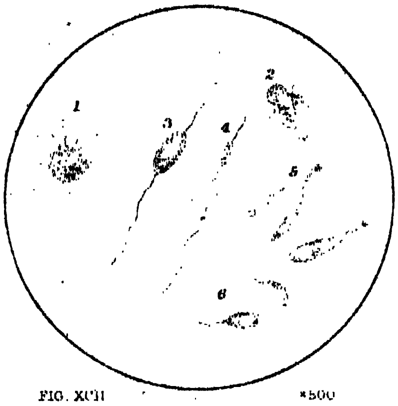


FIG. XCII ×500
1. 2. Panophrys 3.4.6. Euglenæ or Astasiæ 5. Amphileptus.

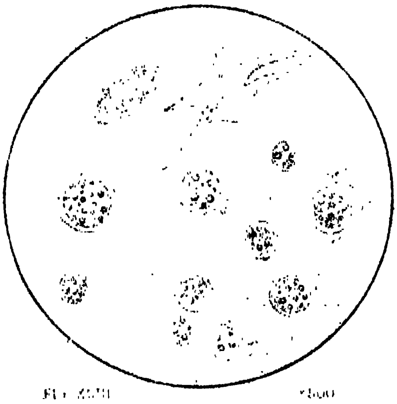


FIG. XCIII ×500
Monera with encysted Animalcule and one Paramecium

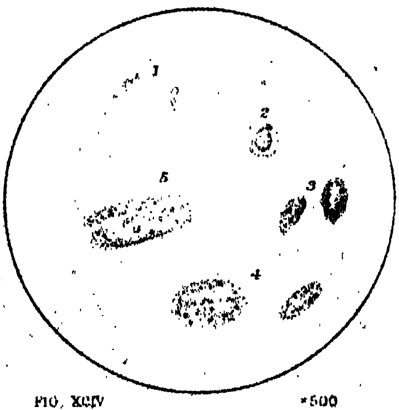


FIG. XCIV ×500
1. 2. Zoosporoids 3. Monas lens
4 Paramecia? 5. Coleps hirtus

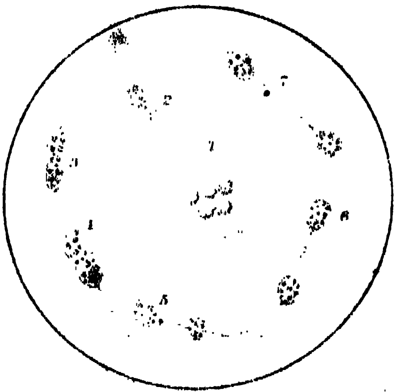
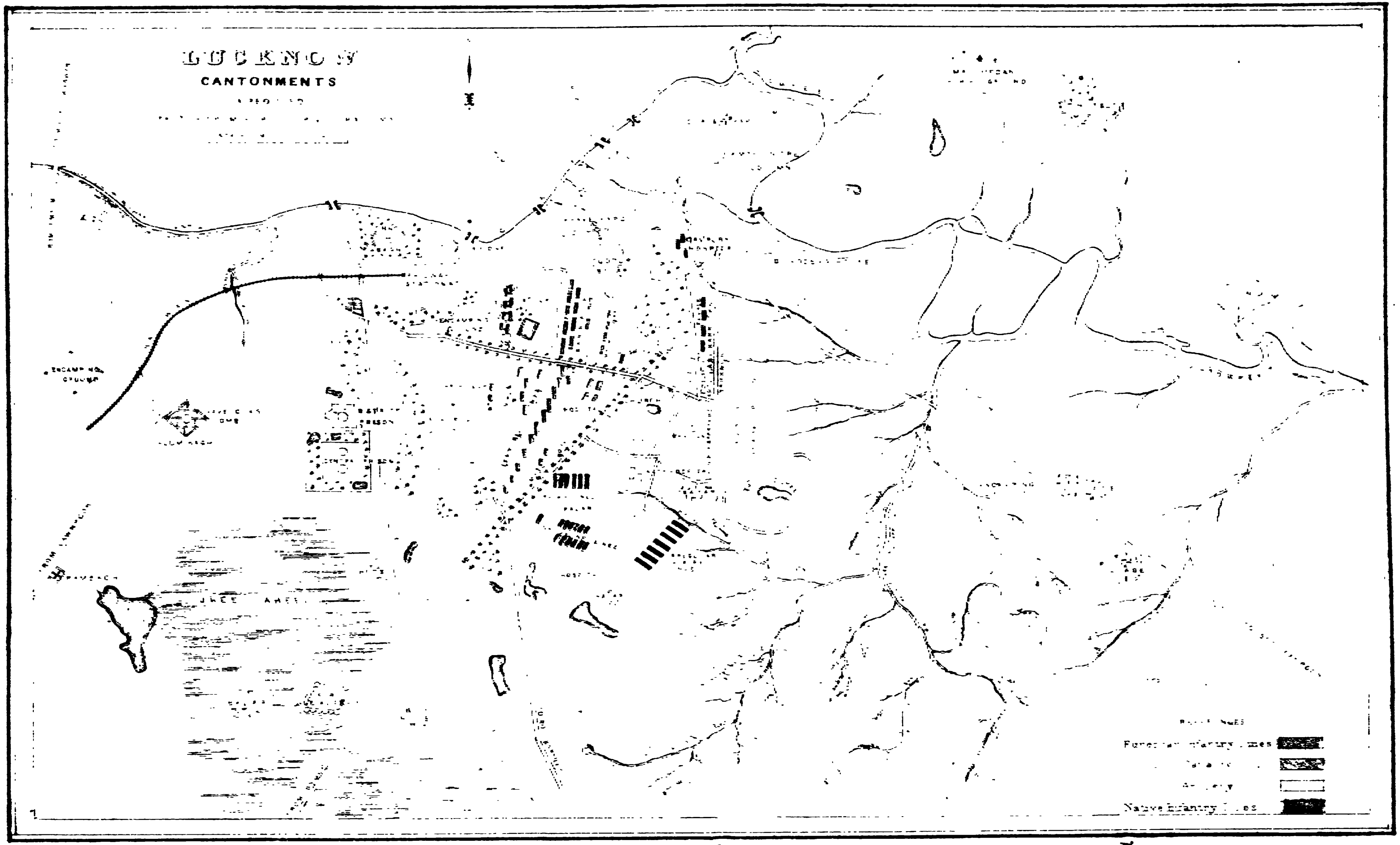


FIG. XCV ×500
1-2 Algæ
3-7 One Monas lens dividing into two

1000th of an Inch ———— ×500

T.R.L. del. C. W. [illegible]

FIGS. XC · I. DEVELOPED IN MOISTENED SOIL FROM ALLAHABAD
XCII · III. ———— LUCKNOW
XCIV. ———— FYZABAD
XCV. ———— MEERUT



Surveyor General's Office, Calcutta

General nature of the soil.

The soil at Cawnpore is very like what it is at Allahabad, but contains less kunkur.

Near the artillery barrack there was more clay than elsewhere, but, as a rule, the ground is very permeable to water.

Wells, and their relation to the river.

Many of the wells are very much nearer the surface, water being found at five or ten feet, instead of fifty or sixty as at Allahabad. Nevertheless, some of the wells examined were thirty feet below the surface. Such a variation I did not observe at Allahabad. The ground slopes towards the Ganges: I could not ascertain whether the rise or fall in the river affected the level of the water in the station; but Dr. Loch states that when the river rises, it swamps a large portion of the country along its banks.

Cholera-camp.

The cholera-camp of the 14th Regiment was pitched at Bhowpore. The ground about this camp was more sandy even than at Cawnpore, and more permeable to water and air. The relative degrees of permeability of this soil and of the soil near the barracks occupied by artillery, cavalry, and infantry regiments are given below:—

	Soil at a depth of 4 feet from	Amount of *air* contained in 100 parts by measure of soil.	Permanganate solution required to give a permanent tint to a solution of 1oz. soil, 10 ozs water requiring 4 decems of the same solution.
	Cholera-camp, Bhowpore	53·3	6 decems
Cawnpore.	" Residency	40·6	4 "
	Lines occupied by 19th Hussars	40·6	4 "
	" " Royal Artillery	46·6	4 "
	" " 14th Regiment	50·0	4 "

Organic matter.

Concerning the amount of organic matter in the soil, the same remarks will apply to this as were made relative to the soil at Allahabad. The soil from the camp at Bhowpore contained more than any of the others.

LUCKNOW.

Cholera mortality among the troops.

The European troops at this station suffered very severely from cholera, nearly a hundred deaths having taken place during the month of August, the men who had newly arrived from England, or had only lately been brought down from the hills, contributing most largely to swell this number.

Lucknow intersected by ravines.

Whilst visiting the various parts of this city, one could but note the extent to which it is intersected by ravines or *nullahs*, a faint conception of which may be obtained by observing the shaded portion of the accompanying little map, as well as of the swampy nature of the surrounding country. Some of these ravines are very deep and contained filth, others contained water which flowed into the Goomtee.

Much valuable information was obtained from Dr. Sutherland, the Sanitary Commissioner for Oude, concerning the course of the epidemic, which he had carefully noted on the spot; nevertheless, no clue could be obtained as to the origin of the cause of this mortality, or the mode by which it spread. In some cases the disease seemed to be localized to a particular spot, but in others no indication of such localization could be traced. As an example of the former, the following will aptly serve:—

Illustration of localization of the disease.

A man was seized with cholera in a barrack on the ground floor, and rapidly succumbed. The bed and bedding was removed and another replaced, which was occupied that night by another man, who was apparently perfectly well;

A single case in the jail.

he also sickened and died the same night! Another: a case occurred in the jail of a man who for a long time previously was not known to have been in communication with a single person from outside. His food and drink were precisely similar to the food and drink of the other prisoners. He was suddenly seized with cholera, and death resulted in a very short time, but the disease did not spread in the jail.

Nature of the soil.

What was the nature of the ground above which these persons lived? No difference could be detected between these and other places in this respect. The upper two or three feet consisted of rubbish, which had been used for "filling up;" then came a layer of sandy soil from two to three feet deep, which was quite moist, below which was a thin stratum of yellowish clay not sufficiently impermeable so as to be capable of holding water for any length of time, the permanent water-level being about thirty feet from the surface. This is attained by digging through some twenty feet of a white sandy soil. Speaking in general terms, this description will apply to the whole of the soil upon which Lucknow stands. It contains considerably more clay than exists in the stations already described, and was subsequently ascertained to be of a rather more impermeable nature.

Extent of permeability and amount of organic matter.

It contained, however, in most places more organic matter, and the specific gravity of its solution was higher.

	Soil obtained from	Depth.	Amount of *air* contained in 100 parts by measure.	Permanganate solution required to give a permanent tint to a solution of 1oz. soil, 10ozs. water requiring 4 decems of the same solution.
		Feet.		
Lucknow.	No. 4 Barrack, occupied by Royal Artillery	3	50·	6 decems
	„ 2 „ „ „ „	3	53·3	10 „
	„ 2 „ „ „ „	6	53·3	10 „
	Hospital „ „ „	3	53·3	8 „
	„ „ „ „	6	53·3	...
	No. 12 Barrack, occupied by 62nd	3	53·3	16 „
	„ 12 „ „ „	6	50·	...
	„ 2 „ „ „	3	50·	12 „
	„ 2 „ „ by 102nd	3	53·3	12 „
	„ 4 „ „ „	3	50·	5 „
	„ 6 „ „ „	3	50·	14 „
	„ 3, Married Quarters, 5th Lancers	3	50·	...
	„ 2 „ „ „	3	46·6	6 „
	Jail, No. 7 building	3	50·	5 „
	„ „ „	6	50·	...

Explanation of Plate XXIII.

	FIGS.	NOS.
Various stages of *Monas lens*	xcvi.	1-6
Euglenæ (?)	„	7-8
Developed in moistened soil from Peshawur	xcvii.-cvii.	
Spore of *Helminthosporium (?)*	xcvii.	1
Monas lens	„	2-3
Various forms assumed by *one* amœba	„	4
Panophrys in various positions	xcviii.	1-5
Amphileptus	„	6
A Paramecium dividing	xcix.	1-4
One of the segments after complete division: the arrow indicates the direction of the current...	„	5
Minute *Monera* presenting no nucleus nor contractile vesicle	c.	
A *Moner* throwing out Pseudopoda in all directions. A great number of vibriones are seen in the field	ci.	

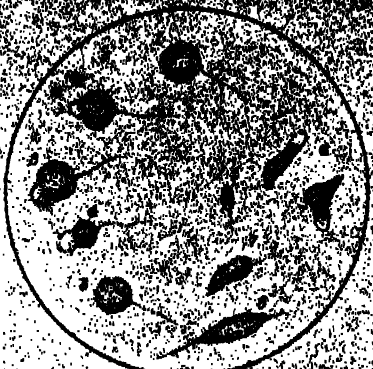


FIG. XCVI. ×500
1–6. Various stages of Monas Lens
7–8. Euglena (?)

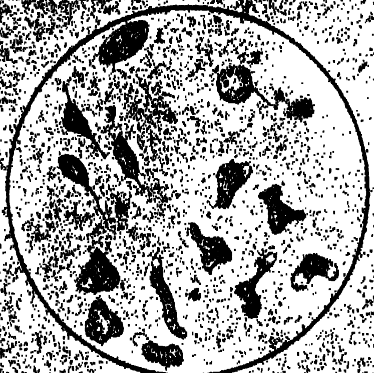


FIG. XCVII. ×500
1. Spores of Helminthosporium (?) 2–3 Monas Lens
4. Amœba, various forms assumed by one

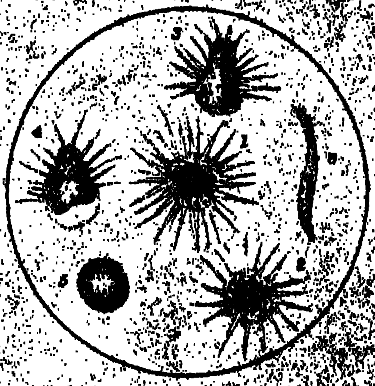


FIG. XCVIII. ×600
Various positions of one Panophrys 1–5
6. Amphileptus

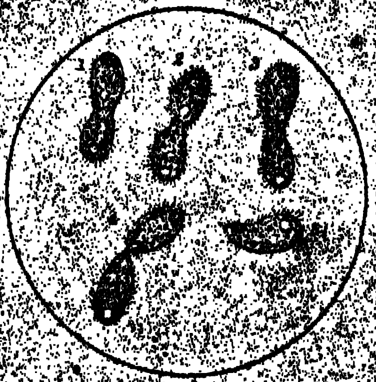


FIG. XCIX. ×600
1–3. Paramecium dividing
4. Division complete

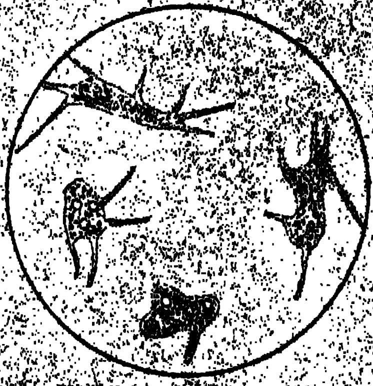


FIG. C. ×500
Monera

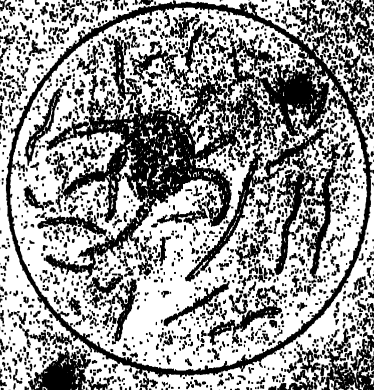


FIG. CI. ×500
Monera with Filaments

FIG. XCVI. DEVELOPED IN MOISTENED SOIL FROM MEERUT.
FIGS. XCVII–CI ——— PESHAWUR.

Microscopical examination.

Several specimens of soil were examined microscopically, but nothing could be detected in the moistened soil for the first two or three days, presenting unmistakable evidence of vitality. Infusorial animalcules of many kinds gradually appeared, but I could not state that any marked differences existed in the various specimens observed. A figure of those which revived in some soil, from No. 2 married quarters of the 5th Lancers, will serve to illustrate what these were (Fig. xcii).

A low form of life, corresponding to the *Monera* described by Haeckel.

In one sample, however, some very interesting low forms of life appeared, about which Mr. Huxley and Häckel have lately written so much. The test tube in which this particular sample (from a depth of six feet in No. 2 barrack, occupied by Royal Artillery) was seen was fortunately a very thin one, and permitted the use of a high power when placed on the stage of the microscope. The bodies observed consisted of minute masses of translucent, colourless jelly, without nucleus or contractile vesicle; in short, not the slightest evidence of structure existed. Their movements were very slow, slower than ordinary amœbæ, and being translucent, it was only by careful illumination that they could be watched. Two of them are sketched at Figure xciii, in the act of protruding long processes of their substance among some animalculæ which have become encysted on the walls of the tube. This moving substance presents precisely the same microscopical appearances as the hyaline, glary matter surrounding the encysted bodies. The little colony depicted of the latter was watched for several weeks, but no changes took place, consequently the nature of the encysted bodies could not be made out. It is very remarkable that such bodies retain their vitality so long, as they must have been imbedded in this dry soil for several years.

FYZABAD.

Site of cantonment at Fyzabad.

Relation of the river to the wells.

There were a few cases of cholera in this station also, but fortunately only two deaths occurred among the European soldiers. The cantonment is situated on slightly elevated ground on the banks of the Gogra, but no part of it is swamped by this river, nor is it believed that the rise and fall of the river affects the condition of the wells.

The soil is sandy everywhere, except near the bed of the river, where there are more traces of clay. Here and there a layer of kunkur is interposed between the upper more clayey layer and the lower one.

Examination of the soil.

A few samples of the soil were preserved for subsequent examination, the result of which may be seen in the table below.

On being microscopically examined, nothing which could possibly be construed as having the most remote connection with cholera could be seen. No spores of fungi could be identified, and the infusoria which became revived in the course of a few days were of the ordinary kind (Fig. xciv).

	Soil at a depth of 4 feet from	Amount of *air* contained in 100 parts by measure.	Permanganate solution required to give a permanent tint to 1oz. soil, 10ozs. water requiring 4 decems of same solution.
Fyzabad.	No. 13 Barrack (11th Regiment)	50·	5 decems
	No. 17 Barrack (11th Regiment)	50·	
	Hospital (11th Regiment)	53·3	

AGRA.

Natives affected more than Europeans at Agra this year.

This station escaped with one death from cholera among the European troops, but the native population in the jail as well as in the bazaars suffered considerably.

Filthy state of ravines.

Dr. Christison very kindly showed me over the whole station, so that, in spite of the shortness of the visit, a fair idea was obtained of its physical geography. As at Lucknow, ravines intersect it in every direction, and for the most part contained filth. In connection with this subject, there is a popular belief amongst the more intelligent native community that, when the river Jumna flows on the city-side of a sand embankment which has formed in its bed, cholera does not prevail at Agra, as the river carries all the filth away, but when it flows on the off side, the disease is more liable to make its appearance. There may or there may not be something in this; there is, however, a serious objection to the river flowing on the city side on account of its tendency to undermine the fortress.

Popular belief concerning the influence of a sand-bank in the bed of the Jumna opposite the fort.

Depth of wells: brackish water.

The wells are very deep, fifty to sixty feet, and the water brackish, but whether the depth of the wells is governed by the amount of water in the river, I was unable to ascertain. This information, however, will shortly be obtained in connection with the registration of the water-level established here as elsewhere.

MORAR.

Mortality at Morar and Gwalior Fort.

When this station and the adjoining fortress of Gwalior were visited, nearly a hundred deaths from cholera had occurred among the European troops, although it was formerly considered one of the places exempted from epidemics of cholera. They had suffered severely in April, and still more so in August, sunstroke having been exceedingly prevalent among the native population as well as cholera. Every effort was made to get all the information possible concerning the epidemic, more especially relating to those points which seemed to bear upon the question as to whether or not the origin and spread of the disease had any connection with the ground upon which the people stood.

Relation of cantonment to river.

The cantonment is situate on a low-lying plain, surrounded by numerous hills on three sides, with the river Morar on the other. Some of the barracks are situated below the level of the river, so that the drains have to be taken in another direction. Other barracks, such as the ones allotted to the Artillery, are about seventeen feet above the level of the Morar.

The artificial lake.

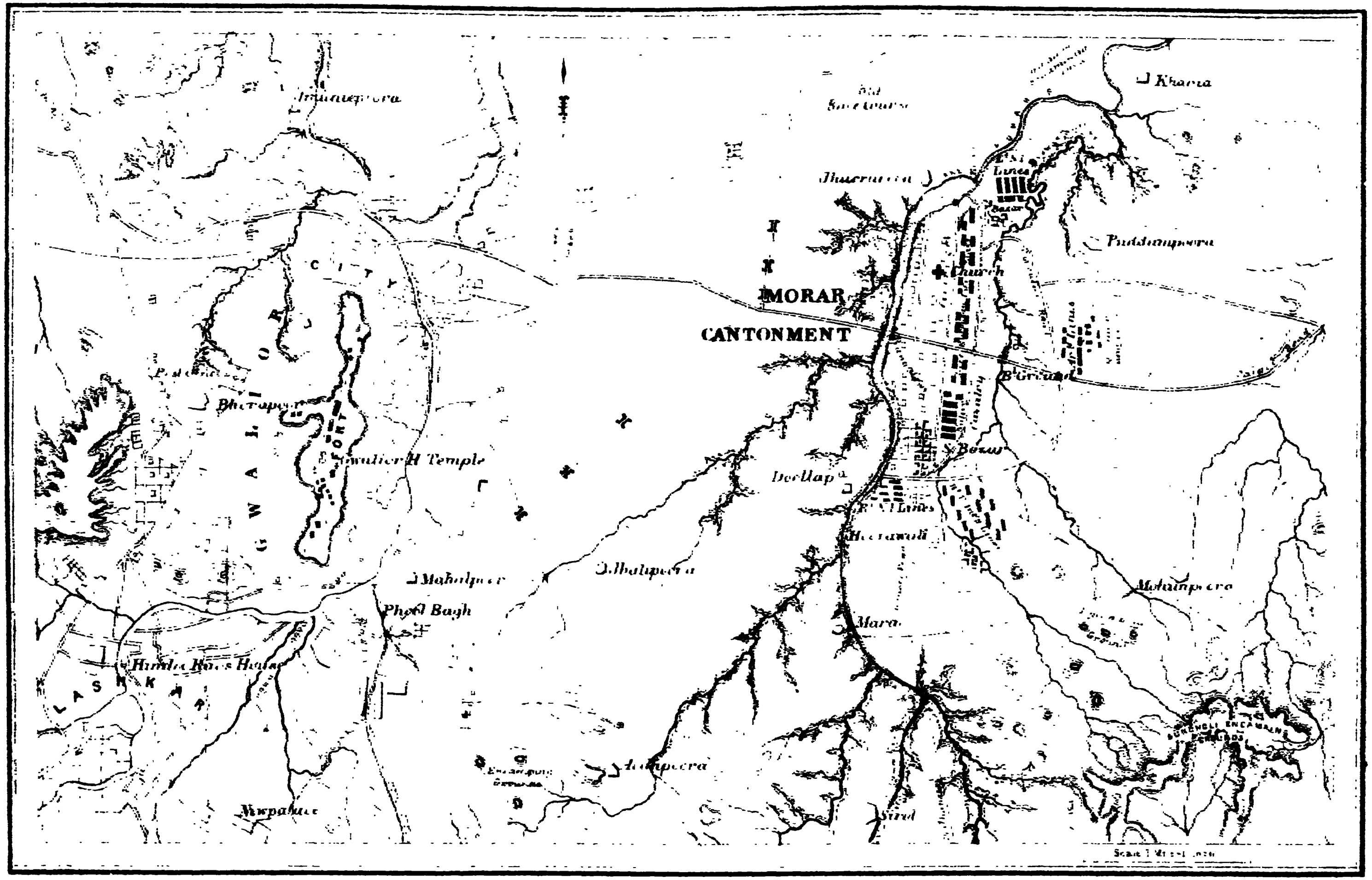
An embankment has been erected across the bed of the river, so as to provide the station with a sheet of "ornamental water," about a quarter of a mile at its widest part, and increasing the depth of the river for about two miles above the dam. It is not improbable that Dr. Pettenkofer, had he been here, would have made minute inquiries as to the extent of moisture supplied to the neighbouring subsoil by this artificial lake.

Depth and variation of wells.

Quality of water.

Black and red soil

The wells are from twenty to forty feet deep; the variation is said to be about five. The water is considered to be good. Dr. Whitwell has examined it very lately, and has kindly favoured me with the particulars of the analysis of an average sample; in this there is not a large amount of organic matter, and no excess of deleterious salts. There are two kinds of soil at Morar, the *red* and *black* soil; both contain persalts of iron, with lime and magnesia, but no *nitrates* nor *nitrites*, as one would have expected to find, had the ground been tainted to any great extent by the ordure of other days; nor was the amount of oxidisable matter, as ascertained by the permanganate of potash solution, by any means excessive, indicating that the barracks and their surroundings had not recently been subjected to contamination.



GWALIOR FORTRESS AND MORAR

A PORTION OF SURVEYOR GENERAL'S MAP.

not regularly distributed;

hence a barrack may stand on soils of varying porosity.

The "black soil" was not universally distributed over the surface. Many yards of excavations were examined in which not a trace of this kind of soil existed; in others, again, a stratum of it was seen extending for long distances; at one end the layer might be ten feet, or more, in thickness, gradually diminishing until it was finally lost in the red; below these, a gritty sandy layer exists in which water is found. The foundation of several blocks of buildings, which were about being erected, were seen to present this uneven distribution of black and red soil, consequently the floorings of such buildings will vary in the extent to which they are permeable to gases, &c., from below; because the porosity of the red earth is considerably greater than that of the black. If Pettenkofer's theory be true, a building placed on this black clayey soil ought to be in a better sanitary condition than those built on the red—other things being equal. The relative porosity and amount of organic matter may be ascertained by reference to the table at the end of this paragraph. The samples enumerated are only a few of the ones examined, General Vaughan having most kindly procured specimens from every portion of the cantonment.

Cholera-camps.

The cholera-camp was four or five miles out of the station, near the summit of two or three little rocky hills, the hospital apparently having a little hill for itself.

Fortress of Gwalior.

A barren- fissured rock

The *Fortress of Gwalior* is about six miles to the west of the cantonment of Morar. It stands on a rock whose summit is about 1¾ mile in length and about ½ mile across in its widest part, and from 300 to 400 feet high, the ascent to which is very steep. Immense fissures may be observed in the rock whilst ascending the steep towards the gate at the entrance of the fort, these being for the most part filled with earth. On entering the fortress, nothing is seen but huge blocks of buildings standing on a barren rock strewn with a few half-withered trees, or rather shrubs. The surface of the rock is naturally very uneven, stone forming the foundation of one end of a building, whilst frequently "made" soil, to the depth of twenty or thirty feet, forms the foundation of the other. The rock itself is a sandstone; splits to any extent, and very easily worked when wet, but excessively hard when dry. It is porous to the extent of one-third of its bulk, consequently able to retain a great amount of any sewage that may be thrown upon it.

of sandstone.

Temperature.

The heat on this rock is very great; it is much complained of, especially as it continues during nearly the whole night, because by the time that it begins to cool, the rays of the sun are directed towards it again.

No original soil.

The samples of soil obtained consisted entirely of rubbish; there does not seem to be an inch in the place undisturbed by man until the bare rock is attained.

Table showing relative porosity and organic matter in the soil.

	Soil from	Depth.	Amount of air in 100 parts of soil by measure.	Permanganate solution required to give a permanent tint to 1oz. soil, 10ozs. water requiring 4 decems of same solution.
Morar.	*(Red.)*			
	No. 4 Barrack, occupied by R. A.	3	46·6	6 decems
	Ditto ditto	6	46·6	9 "
	No. 9 Barrack, occupied by 103rd	3	63·	6 "
	No. 2 Barrack, ditto	3	...	5 "
	No. 4 Barrack, occupied by R. A. (Yellow clay)	3	45·	4 "
	(Black.)			
	No. 2 Barrack, occupied by R. A.	3	34·	5 "
	Ditto ditto	6	36·	4 "
	No. 6 Barrack, occupied by Md. Qrs., R. A.	...	33	6 "

MEERUT.

The epidemic at Meerut preceded by rain.

Nature of soil.

Cholera visited this station in September and the beginning of October, having been preceded by a heavy fall of rain. Nineteen cases occurred, with fourteen deaths, among the European soldiers, whilst about a hundred cases occurred among the natives of the bazaar. The cantonment is situated on a large plain, with scarcely any fall, consequently not admitting of good natural drainage. There is a deep ravine separating the European and the Native lines, on either side of which for a short distance good clay is found; otherwise it is rather sandy everywhere, quicksand being frequently met with in digging the foundation of a building.

Intimate connection between surface drainage and the wells.

The wells are not very deep, water being generally attained at about 10 to 12 feet from the surface, the extreme variation in which is, according to Dr. Berkeley, about five feet. Rain rapidly affects the level of the water in the wells, the amount of rise of the latter being almost equal to the fall of the former. This is the reverse of what occurs at Allahabad, where a great portion of the rainfall either drains to the river or is evaporated before reaching the permanent water-level. This intimate connection between the wells and the surface at Meerut is of great sanitary importance. Seeing the ease with which any sewage may get into the wells, and as the condition of the ground does not permit of free natural drainage, it is self-evident that the greatest attention should be paid to remedying this defect by artificial means.

Relative amount of organic matter and porosity of the soil.

In the more minute examination of this soil, subsequently undertaken, no evidence existed of the ground in the vicinity of the barracks being in a polluted condition, and on the whole was rather less porous than the soils already alluded to, with the exception of the black soil at Morar.

	Soil at a depth of 4 feet from	Amount of *air* contained in 100 parts by measure.	Permanganate solution required to give a permanent tint to a solution of 1oz. soil; 10 ozs. water requiring 4 decems of same solution.
Meerut...	Between Nos. 44 & 46 (105th Regiment)	45·	5 decems
	" " 34 & 39 " "	50·	6 "
	" " 43 & 48 " "	50·	5 "
	" " 1 & 2 (4th Hussars)	55·	5 "
	" " 13 & 14 " "	46·3	5 "
	Married Quarters, No. 15, R. A.	50·	6 "

Microscopical examination of soil.

This soil was examined microscopically in the same manner as the others were, with somewhat similar results. During the first few days its solution contained no infusoria, at least not in motion, but subsequently they made their appearance in great numbers. These in one sample, namely, in the soil from between Nos. 1 and 2 blocks, occupied by the 4th Hussars, consisted almost entirely of various phases in the existence of *monas lens* (Figs. xcv & xcvi). These alter their form very rapidly, frequently protruding an amœba-like vesicle, as seen at Nos. 1 to 5, Figure xcv, which represents one animalcule assuming different forms. There are also great numbers of very minute amœbæ (6) which seem to be an earlier stage of this animalcule, and when it gets older it becomes elongated (7-8), sometimes acquiring two filaments.

EXPLANATION OF PLATE XXIV.

	FIGS.	NOS.
Various forms assumed by a single *Moner* in the course of two minutes. The vacuolæ are not permanent, nor do they appear rhythmically. The coloured granules are drawn into its substance during the retraction of the pseudopods. The engulphed granules flow in the direction of the projected part	cii.-vi.	
Two *Moners* which have become spherical and still (under a lower magnifying power) ...	cvii.	

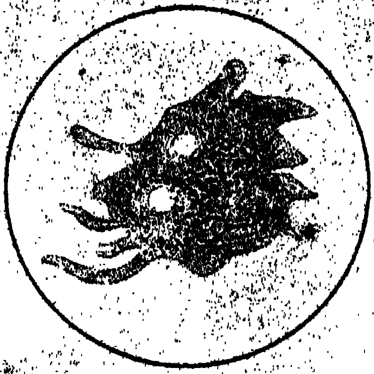


FIG. CII. ×800

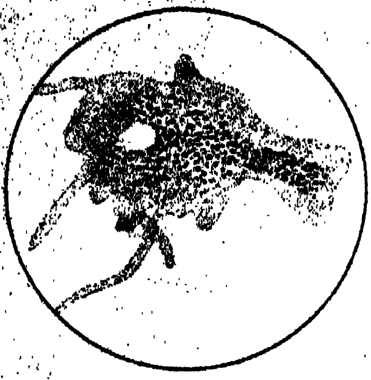


FIG. CIII. ×800

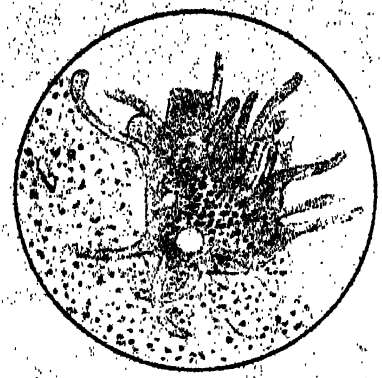


FIG. CIV. ×800

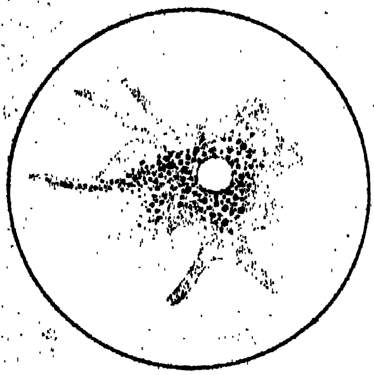


FIG. CV. ×800

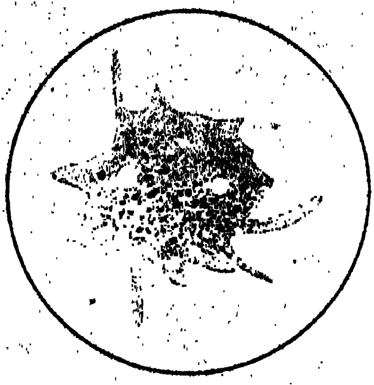


FIG. CVI. ×800

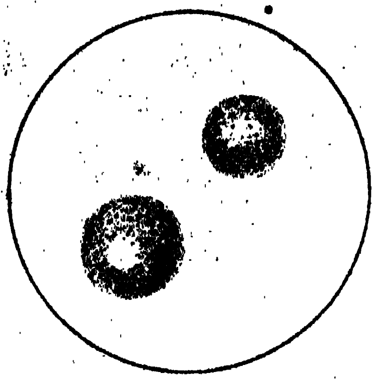


FIG. CVII. ×500

1000th of an inch ×500 ×800

T. R. L. del. [illegible] sc.

FIGS. CII CVI. DEVELOPED IN MOISTENED SOIL FROM PESHAWAR
VARIOUS FORMS ASSUMED BY ONE IN TWO MINUTES
FIG. CVII. .... FOREGOING BECOME SPHERICAL & STILL

They are frequently seen to multiply by division, as seen in Figure xcvi, where No. 3 runs through the stages delineated at 4 to 7 in the course of five minutes, the two at 7 becoming as perfect in all points as the original one. The green bodies in the figures, which rolled about the field, are *algæ*.

PESHAWUR.

Soil from Peshawur.

The Sanitary Commissioner having subsequently visited Peshawur (where over 350 cases of cholera were reported as having occurred during the month of September among the European troops alone), favoured me with two samples of soil, one sample from a depth of three feet, and the other from a depth of six.

Spongy nature of soil.

It was in hard lumps, of low specific gravity, owing to its spongy nature, exceedingly like a piece of pumice stone, and when applied to the lips, so freely could air be made to pass through, that a feather placed on one end of a table could be readily blown to the other.

Its relative porosity and organic contents.

Its solution was slightly alkaline, and contained rather more organic matter than the average, as may be seen from the subjoined table:—

	Soil from a depth of	Amount of *air* in 100 parts by measure.	Permanganate solution required to give a permanent tint to a solution of 1oz. soil, 10ozs. water requiring 4 decems of same solution.
	Feet.		
Peshawur.	3	50c	10 decems
	6	50c	8 „

Microscopic examination.

It was subjected to a prolonged microscopic examination. During the first three days a number of molecules developed in the fluid containing the three feet soil; then an abundance of animalcules like the ones alluded to in connection with the Meerut soil (Fig. xcvii, 2-3). At Nos. 5, 6, and 7 various forms are depicted, assumed by one in two minutes, which was also occasionally seen to jerk suddenly in the same manner as 2 and 3. The reddish body at 1 is a spore, probably belonging to the *Dematiei* family—a very common fungus.

Another of Haeckel's *Moners* (?)

The test tube containing the other sample of soil from a depth of six feet having been left undisturbed for a week, was, on examination, found to contain several examples of slimy bodies of a lower organization than the amœba, there being no contractile vesicle, although generally one or more vacuoles were seen (c). Nearly all of them contain molecular matter, which flows towards the portion of substance in the act of being projected. Figures cii to cvi illustrate the various forms assumed by one of these in the course of twenty minutes. They were not seen to divide, nor did the protruded processes become amalgamated when they crossed each other. A great number of vibriones developed in this solution, more so than I had observed in any of the other specimens of soil examined, and were very active. These are figured at ci, amongst which one of the just described *moners* is seen with extended processes, which were observed to wander throughout the fluid something like the "horns" of a snail. To these processes monads and small vibriones adhered, which were drawn into the substance of the *moner* as the processes were retracted. Three days afterwards, all the *moners* had become spherical and perfectly still (cvii).

Vibriones unusually prevalent.

***Monera* become spherical.**

The other animalcules which made their appearance were those commonly met with, and require no special description. They are figured at xcviii and xcix, where the names are also given.

Concluding remarks.

Having already alluded to the chief points in connection with these experiments, whilst describing the various places visited, it is not considered necessary to refer to them again. The observations concerning the physical geography of the stations are of a more superficial nature than I could have desired, but the time at my disposal was very limited, and correct information on such matters could not be obtained without personal inspection. It will, indeed, be evident that the experiments referred to in the whole of this report are of an elementary nature. This is, in part, owing to the short period which has elapsed since they were commenced, partly also to my having been tempted, by the desire for results, to keep too many irons in the fire. I trust, however, that what has been done will prove to be a foundation whereupon better things may be built.

In conclusion, I respectfully tender my most sincere thanks to Dr. Muir, C. B., Inspector General of Hospitals, British Troops, for the assistance which he has so gladly rendered on every possible occasion to further this inquiry, and for the personal interest he has taken in the details thereof; also to Dr. Cuningham, the Sanitary Commissioner with the Government of India, for similar aid, not less cheerfully given.

APPENDIX B.

REPORT ON THE GENERAL ASPECTS OF CHOLERA IN 1869;

A SEQUEL TO THE

HISTORY OF EPIDEMIC CHOLERA IN THE BENGAL PRESIDENCY IN 1866-68.

BY

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STATISTICAL OFFICER ATTACHED TO THE SANITARY COMMISSIONER WITH THE GOVERNMENT OF INDIA.

CONTENTS.

INTRODUCTION.

PAGE.
Circumstances tending to introduce obscurity into the previous report 185
Facilities afforded for the study of the epidemic cholera of 1869 186
Arrangement of the report for 1869 188

PART I.

RECAPITULATION OF THE LEADING FACTS IN THE CHOLERA HISTORY OF 1868 AND CONNECTED WITH THE RENEWAL OF CHOLERA IN THE SPRING OF 1869, AND THE ANTICIPATIONS FORMED REGARDING EPIDEMIC MOVEMENT BETWEEN JUNE AND SEPTEMBER.

Western limit in the North-Western Provinces of the invading cholera of 1868 188
Supplementary details regarding the Province of Oude, and the corrections required in the map of 1868 in relation to these details 188
Western and northern limit of the bounding line of the invading cholera of 1868 in the Central Provinces 189
Line limiting in the East the tract of the Central Provinces invaded in 1868 189
Extension from the north-east into the Bombay Presidency of the invading cholera of 1868 189
Geographical arrangement of the deaths from cholera registered in the Bengal and Bombay Presidencies in 1868 190
Meteorology in relation to which the movement from north-east to south-west occurred 191
Termination of the epidemic journey commenced in April 1868 192
Offshoot into the Northern Epidemic Route in December 1868 192
The relation of the cholera of the invaded tract of 1868 to the uninvaded tract, the western division of the epidemic area 193
Invasion from the same endemic source from south-west to north-east towards the Assam frontier ... 193
Revitalisation of the invading cholera of 1868 in the spring of 1869... 193
Significance of the geography of the revitalised cholera of the spring of 1869 194
First movement from out of the area covered in 1868. The occupation of the tract lying south of the Jumna 194
Anticipations grounded on the geography of the cholera of the spring of 1869 after the first movement of the year had occurred 194
Letter from the Sanitary Commissioner in anticipation of the movement of cholera over Northern India with the monsoon of 1869 194
Geographical position of the cholera of the epidemic as recognised at the time when this letter was written 195
Memorandum which accompanied the Sanitary Commissioner's letter of 18th June 196
Report on the progress of cholera up to the middle of August, called for after the monsoon outbreaks of the year had begun to appear 198
Interval between the spring and monsoon cholera noted 199
Anticipations regarding the cholera of the year from the middle of August onwards 200
Anticipations formed from the history of the cholera of the year up to the first week of September ... 202
Anticipations regarding the persistence of cholera in the Peshawur valley, and the movements required to escape the localised choleraic influence 202
Anticipations regarding the capabilities of the stations of the extreme north of India for localising an epidemic cholera 203
The appearance of cholera in the Peshawur valley being without a parallel in recent epidemic history, its occurrence was not anticipated 203
Explanation of the phenomenon, and the anticipations formed as soon as the fact of the appearance of cholera on the frontier was reported 203
Movement of cholera in the first week of September, and later in the year in countries beyond the limits of Hindostan 204
Many difficulties lie in the way in trying to estimate the position of an epidemic cholera and the occurrences likely to follow. Some of these are insuperable 205

PART II.

THE HISTORY AND GENERAL ASPECTS OF EPIDEMIC CHOLERA IN 1869.

Areas of exemption in 1869 206
Exempted area of the North-Western Provinces continued into the Punjab 207
Intrusion into the exempted tract from the south reaching as far as the Meerut District 207
Etawah, a portion of the exempted area 207
Definition of the exempted tract in the North-Western Provinces and Punjab 208
Significance of the exemption of these tracts, and of the offshoot which reached the Meerut District ... 208
Exempted tract in Northern India, the districts lying immediately beyond the usual limits of monsoon influences 208
Cholera deaths registered among the general population of the Bengal Presidency in 1869 209
General connection of the cholera of 1869 wherever met with, and the links joining on this cholera with that of the endemic basin 211
Occupation by invasion of the districts lying south of the Jumna. Movement of the last week of May... 211
General occupation of the Northern Epidemic Highway 211
Simultaneous appearance of cholera over widely separated districts of Rajpootana 211
Cholera of the same period in the Bhopal State and the neighbourhood 212
Invading cholera of the same period in the Agra and Meerut Divisions 212
Cholera of the same period in the districts south of the Jumna 212
General conclusions regarding the cholera of the epidemic highway of the first week of June ... 213

PAGE.
Modified influence of the cholera of the same movement in the districts beyond the northern margin of the epidemic highway 213
Cholera of the same date on the opposite margin of the natural province from that by which invading influences enter. Cholera of Sealkote, Umritsur, and the Simla hills 213
Cholera in Persia in the middle of June 214
Meteorology accompanying the movement of cholera in the last week of May and the beginning of June 214
Phenomena accompanying the setting in of the monsoon over Upper India 214
The appearance of the monsoon cholera of the year 215
Illustration from the history of the Umritsur cholera, of repression after invasion, of culmination with monsoon influences, and of natural decay 215
Indices in types of the community which show that the parallels of 1856 and 1861 in this locality might readily have been repeatedly in 1869 215
Significance of the Subathoo cholera of the same period commencing on 6th August 215
Dates of the commencement of the monsoon outbreaks among the jail population ... 216
Monsoon movement about 17th August corresponding probably with that usually observed in the last week of July and first week of August. The special meteorology by which it was accompanied .. 216
Meteorology causing the repression of movement in the end of July and first week of August, and attending the movement of 17th August 216
State of the Punjab towards the end of August, a province from which invading cholera of the year was repelled at this season 217
Shadow of the cholera of the second and third weeks of August in the southern districts of the Punjab ... 217
Movement of the first week of September. The meteorology which accompanied the movement of cholera over the invaded area 217
Appearance of cholera in the city of Peshawur and the subsequent history of the outbreak 218
The outbreak in the Peshawur cantonment 218
The significance of the interval between the cholera of the Peshawur cantonment of 11th September and the great outburst on 18th 219
Cholera outbreaks of the Punjab of the first week of September, which appear to have come forward with the same meteorology which determined the outbreak in the Peshawur valley 219
Invasion of Northern Scinde in the same week 220
Cholera of Kotree commencing on 8th September 220
Cholera of Kurrachee beginning on 21st September 220
Cholera of Caubul, Astrabad, Meshed, and Kieff appearing between the 1st and 15th September .. 220
Influences prevailing up to third week of August causing famine throughout Central and Northern India, probably associated with the drought in Central Asia 221
Persian cholera of September and October 221
Cholera of Zanzibar—October 1869 to February 1870 222
The meteorology accompanying the invasion of Eastern Africa 222
Monsoon cholera of 1870 in Eastern Africa 223
History of the cholera of the same epidemic in Assam in 1869 223
Cholera of the same epidemic in the Berars and Hyderabad 224
Occupation of the Chutteesghur Division of the Central Provinces 224
Dates of decay of the great cholera of the Central Provinces 225
Cholera of November of Peshawur, Kohat, Bunnoo, and Meerut, and the disappearance of the cholera of 1869 225
General characteristics of the year and the aspects of disease generally in relation to these characteristics. The alliances of the epidemic malaria with the cholera of 1869 225
Universality of the development of malaria throughout the Punjab in the second week of August ... 226
Fever of 1869 universal from Allahabad to Kurrachee 226
The distribution of this fever was distinctly provincial. Statements illustrating the geography of the epidemic, and giving the ratios for a non-epidemic year in contrast to those of 1869 . .. 227
Rainfall of the monsoon season in the different districts of Central and Upper India, and the natural arrangement of areas in relation to the amount of rain which they receive 227

PART III.

THE ASPECTS OF THE CHOLERA OF 1869 AS SHOWN IN THE AFFECTION OF COMMUNITIES.

Any type repeats what is taught by the phenomena shown over the entire area covered, or in any part of it 231
The general aspect of the monsoon cholera of 1869 as exhibited among the European Regiments cantoned within the monsoon area 231
All statements made by local observers regarding the introduction of cholera by human intercourse are of no permanent value until reviewed in relation to the general epidemic phenomena of the year .. 232
Illustrations from the cholera history of 1869 of outbreaks which conform to the shape indicated as typical in the previous report 233
All phenomena connected with the manifestations in communities are subordinate to the laws which control the manifestations over areas 233
The cases of the population of the cities of Umritsur and Peshawur taken in contrast show how cholera may gradually develop in a locality after its original dissemination, or may appear in its utmost strength in a very few days after its precipitation 233
The sprouting of the seed sown on a certain day. Parallel of 1867 and 1869 in the Peshawur valley . 234
Value of the lesson taught by this parallel, as showing that there may be an interval during which escape from the localised cholera is possible 234
Localisation in the Kohat valley, in continuation of the description given of the same phenomenon in the report for last year 234
The garrisons of Nowshera and the stations east of the Indus escaped, because of the geographical situation and physical aspects of these stations 234
The aspect of the outbreak as determined by the passage over a district of the aura of an air-conveyed cholera 234
Loss of the European and Native troops cantoned within the monsoon area contrasted 235
Comparative loss of the Europeans in the Lucknow cantonment and of the native population of the city of Lucknow... 235
The low death-rate of the jail population throughout the epidemic area 235

Page
Loss in the Lunatic Asylum at Lahore ... 235
Apparent immunity of very young children as shown in the returns of European children for 1869 ... 235
Results of the establishment of quarantine in various localities during the progress of the epidemic cholera of 1869 ... 235
Local observers fail to connect the outbreak with the poisoning of the water-supply by what emanates from those suffering from cholera ... 236
The outbreaks of 1869 were not in any instance attributed to the use of the regimental latrines ... 236
The effects of attendance on the sick treated of by the Sanitary Commissioner ... 236
The term "the importation of cholera" as used by different observers. Cases in which it has been asserted that the epidemic cholera of 1869 of districts was due to importation ... 237
Alleged radiation of cholera from Umritsur as a centre ... 237
The evidence in favour of the importation of the cholera of 1868 and 1869 into the different districts of the Central Provinces is not satisfactory ... 237
The phenomenon of the spread of cholera from foci is not seen in the case of emigrant ships, where, from experience of contagious diseases, we know that spread from a focal centre is certain to occur after the introduction of the zymotic germ ... 238
The outbreaks on board emigrant ships taken in the aggregate assume the typical form ... 238

Conclusion ... 239

TABULAR STATEMENTS CONTAINED IN THE BODY OF THE REPORT.

Statement showing the epidemic connections of the cholera of Oude of 1868 ... 188
Cholera deaths registered among the general population of the Bengal and Bombay Presidencies in 1868 ... 190
Table illustrating how cholera moves from north-east to south-west on the Southern Epidemic Highway 192
Table showing the occupation of the eastern portion of the Northern Epidemic Highway in the spring of 1869 ... 194
Table illustrating from the history of previous epidemics the succession of a powerful monsoon cholera to that of the spring ... 197
Table showing in the case of the European Troops the dates of the disappearance of the spring cholera of 1869, and of the reappearance of cholera in the monsoon season ... 199
Cholera deaths of 1869 in the exempted belt beyond direct monsoon influences, which usually protects the north-western frontier from the attack of cholera during primary invasion ... 203
Statements by the Civil Surgeons corroborating the fact of exemption in the tracts exempted in 1869 206
Cholera deaths registered among the general population of the Bengal Presidency in each month of 1869 209
Table of dates illustrating the simultaneous commencement of the outbreak of cholera in different parts of Rajpootana in 1869 ... 211
District reports of the Central Provinces showing the meteorology accompanying the movement of cholera in the last week of May and the beginning of June ... 214
Dates of the jail outbreaks of the epidemic area in the monsoon season of 1869, corresponding with table page 186, showing the dates of the outbreaks among the European Troops over the same area 216
Cholera outbreaks of the Punjab of the first week of September, which appear to have come forward with the same meteorology which determined the outbreak in the Peshawur valley ... 219
District reports of the Central Provinces, 9th to 15th May, showing that in this week the breaking up of the great and persistent heat occurred ... 224
Weekly reports from the different districts of the Central Provinces indicating the decay and dying out of the cholera of 1869 ... 225
Punjab, Native Troops. Statement showing the commencement and progress of the epidemic malaria of 1869 ... 226
European Troops in the Gangetic provinces and in Central and Northern India. Statements showing that the distribution of this fever was distinctly provincial and illustrating the geography of the epidemic, and giving the ratios for a non-epidemic year in contrast to those of 1869 ... 227
Monsoon rains of districts in 1869, 1st June to 10th October ... 228
Monsoon rains of 1869. Rainfall of each day in the different districts of the North-Western Provinces and Punjab ... 230
Table showing the aspect of the general outbreak of cholera over the monsoon area. Cholera admissions of each day in European Regiments men, women, and children ... 232
Illustrations from the cholera history of 1869 of outbreaks which conform to the shape indicated as typical in the previous report ... 233
Statement showing the typical aspect of the outbreak of cholera on board emigrant ships leaving Calcutta for Mauritius and the West Indies ... 238

STATISTICAL REPORT

ON THE

GENERAL ASPECTS OF EPIDEMIC CHOLERA IN 1869.

INTRODUCTION.

HITHERTO, in trying to explain the epidemic relations of the cholera of any year, the difficulty has constantly presented itself, that I have been compelled to make use of an unrecognised nomenclature, and to assume as fact what others have been unable to appreciate except as theory which has still to be substantiated. I have been compelled to speak of the age of the existing epidemic, of its distribution in space, of the dates of appearance of dormancy and of decadence in relation to geographical site, of the movements of different waves of the epidemic, and of the phenomena accompanying advance; and while doing so, I have felt that I was asking for credence where at every step I was liable to be called on for explanation of phenomena whose significance I had interpreted in accordance with a theory not yet accepted. In order that the generalisations which I held provisionally might be clearly understood, and that the facts upon which these were based might stand recorded, I tried in reviewing the epidemic history of 1866-68 to throw the narrative in all its bearings into such a shape that a standard of reference might not be wanting when the history of epidemic cholera in future years was being written. In advancing a system embodying not one but twenty unrecognised or half-appreciated theories, it need not be a matter for wonder that I should have failed in some instances fully to elucidate the acknowledged obscurities which surround the subject. In other instances, however, when I may but imperfectly have illustrated my proposition, the fault has been my own, in taking for granted without adducing the proof which might readily have been forthcoming, something less apparent to the reader than to myself accustomed in my own mind to pursue an argument for which all the data are present. Nor must it be forgotten that I have distinctly referred my generalisations to the test of future experience. I have been contented to produce many generalisations as suggestions, and I have not asked that these be received unless they shall have stood the tests indicated. For no proposition is of the value of a law unless the data upon which it is based are true for all time to come, and can be recognized as true by any one who has carefully studied the history of the past from which the deduction has been drawn. Many suggestions I have offered for my own study as well as for that of others; for the study is long, and those who would accuse me of having on insufficient grounds tried to divert the study of cholera as an epidemic to a wrong direction, will have reason for their objections, if I cannot show, or if those who trusting to my facts have undertaken to study this epidemic history in a definite direction fail to perceive, the parallelism of recurring phenomena and the fixed place in a system of the events which occur year by year.

I propose, therefore, to write the epidemic history of 1869 in relation to the propositions laid down in studying the history of the cholera of 1866-68. I shall show the facts of 1869 as parallels, and trace them in relation to the theories of revitalisation and decay, and of progression and limitation in space already defined; and the outbreak of communities I shall also study, following out the conclusions of the second section of my previous report. The data of 1869 will, in short, afford the first opportunity for testing the stability of the theories founded on experience ending with 1868.

I have said, that even in cases where occurrences may be forming themselves into true parallels, want of appreciation may be the cause of our overlooking the significance of events, and that upon a retrospect their true place and meaning become apparent, and we have then no difficulty in reinstating them in their position in epidemic history. Sometimes our anticipations in regard to coming events will be absolutely realised. At other times what might have been exhibited in substance is shown in shadow only. But the true student will not on this account allow the phenomenon to escape his notice or to pass unrecorded, and those who have most earnestly watched the phenomena occurring in the course of the advance of cholera know best how to rate even trifling indications at their true value. Month by month, the registration of deaths throughout the Central Provinces and Upper India is becoming more complete and accurate, and the student of epidemic history will in the future enjoy advantages in his pursuit which have up to a very recent date been denied. We have, hitherto, been compelled to fall back upon recorded statements in place of statistical data in estimating the prevalence of epidemic cholera among the population of any province, and true as are the indications afforded by the types which we study in particular, the absence of an aggregate of figures has always been felt to be a serious drawback. Those who do not know how true are the indications afforded by types of a community as regards cholera cannot be expected to feel the same confidence in deductions from the statistics of these types as observers who employ them knowing them to be accurate indices. No one in following out the history of an epidemic can ignore the advantage of information derived from all sources. And speaking from experience I know that the wider the data, the more perfect will be the harmonies. It is not true, as some would allege, that the statistician theorises best from imperfect or inaccurate data. A rigorous system of statistical research will meet its reward in forming the ground-work of true theory. Accumulated experience sustained by a statistical record affords the best guarantee for the diminution of error and for the advancement of what is scientifically true.

The report which follows is to a very great extent a commentary on various papers communicated to Government during the progress of the epidemic of 1869. These documents being given in original, an opportunity is afforded for judging how far the anticipations formed were borne out by the course of events. I shall try to make clear the train of thought which led to the various suggestions offered; and whether the anticipations may have failed, or whether my appreciation of the significance of different occurrences during the year has been made after, and not during the time the events were in progress of manifestation, the lessons taught will be none the less worthy of study, with the view of fixing each in its proper place the manifestations of the past year.

Although my report on the cholera of 1866-68 was in the hands of the printer in February 1869, various causes delayed its publication, and I was able to a certain extent to add to the first section the results of my study of the cholera of 1868 as elucidated by the revitalisation and progress of the same cholera in the spring of 1869; and in the last paragraph, written and printed before the monsoon manifestation of the cholera of 1869, I was able to predict that advance on Northern India and beyond Hindostan was imminent. In my report and in the report of the Sanitary Commissioner for 1868, the area covered by the cholera which I traced epidemic within the endemic province, and invading to the west and south-west in April 1868, is most distinctly mapped, and its geographical limitation, and its intensity in relation to the population of the districts invaded are clearly defined. The behaviour of this cholera after its revitalisation in 1869 is the subject of the present report. We are called on to study its relation to the provincial areas covered in 1868 as regards appearance, culmination and decay, the phenomena attending the breaking through of the boundaries shown upon our map of 1868, the geography of this invading cholera, and the record of its dormancy or death in the last months of 1869. I trust that the greater facilities afforded to me in the collection of statistical facts may enable me to write the history of 1869 with clearness and precision, so as in some measure to lessen the difficulties which those who have undertaken to study the subject have felt in using my first report as their guide, from the intricacy of the arguments and from the extent of the data which I was of necessity obliged to incorporate in recording the results of a primary study. Had the study of the phenomena of cholera in India been free from difficulties, we should not now after an experience of fifty years have been compelled to bring forward propositions as fundamental in opposition to those of secondary import, alleged, notwithstanding many and insuperable objections, to be in themselves sufficient to constitute a system, nor should we now be trying to elaborate a system founded upon truths which all experience shall show to be fundamental. I have not asked that my statement of facts and my interpretation of their significance shall be accepted from what I have already written. I have offered to test by the occurrences of every day what I have proposed for acceptance, and it has been my wish to afford to every observer the means of judging of these facts for himself, and not of them as they stand interpreted by my sympathies or preconceived ideas. I do not hesitate to recognise that to one who is not thoroughly interested in the study of cholera my late report presents many intricacies; but those who have most carefully perused it have been enabled to grasp the plan of the work as far as it indicates the method in which a natural system may be built up, and having done so have had satisfaction in going back to review the facts in relation to the position which they are made to occupy in the system. Those can know little of the harmonies of epidemiology and of the rigid laws which govern these harmonies, who would accuse me of sitting down with this vast collection of facts before me and ambitiously distorting each into a place in a system, which as a system has no real existence. Different observers will interpret the same facts differently. The uneducated man has no difficulty in satisfying himself that the ice groovings on a boulder are the work of the stone-mason. In science there is a recognisable limit to diversity of interpretation, and he whose education is the more complete can go further in advance than the man who has no intimate knowledge of the subject of which he professes to treat.*

It has almost been demanded that the result of a study of the cholera of India should show one immediately remediable condition to be the cause of the outbreak; and the hope has been that when this exciting cause is removed, cholera shall no longer show itself. When I have maintained that the epidemic is an inevitable evil, and the outbreak although capable of being mitigated, also inevitable, it has been asserted that such doctrines obstruct the progress of sanitation as a science. I have nothing to add to what I said in the previous report, namely, that sanitary science attains perfection only when based on scientific truth. The constantly repeated assertions of individuals that the adoption of some one measure suggested by their particular theories will at once put an end to the manifestation of epidemic cholera in our cantonments receive no sanction from the history of cholera in 1869.

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* "So many of Dr Bryden's facts are susceptible of explanations different from those assigned by him, that we might occupy an entire *Lancet* and fail to exhaust them."—*Lancet, February 26th*, 1870.

The proposition—that the geography of the cholera of any year is definite and can be mapped, I have held to be fundamentally true. If it be true that the area covered is a natural area, and that the limitation of the cholera of any year is defined by the causes which I have grouped as natural, it follows, that without the clear recognition of the geography of the cholera of any year as subordinate to the causes which have determined this geography, the local observer is not in a position satisfactorily to generalise as to the extent to which secondary causes may have affected the manifestations of cholera within the area exhibited in relation to the included population. So long as the doctrine of the distribution of the cholera of the year by natural agencies is rejected, so surely will there be found substituted for it, not one, but all of those propositions which were taken together and admitted for the sake of argument to be true to the fullest extent, I have maintained to be totally inadequate to explain the phenomena of cholera as an epidemic, and to be as the basis of a complete system, practically useless. We find the local observer driven to lay hold of the theories assuming the contagiousness of cholera, the communicability of cholera, the poisonous nature of the emanations of cholera patients, and the poisoning from this source of the water-supply; and even after having admitted all, still forced to allow that his theory of importation is incomplete unless the concession be also made, that a body of men among whom cholera has not appeared and shall not appear, may prove the agency by which a province is infected.

The cholera of which I now propose to write the history, is that of an epidemic in its second year after leaving its endemic home. The cholera of 1868 I have described as a cholera invading from within the endemic province in the early months of the year, and its geography as manifested up to the end of 1868 is delineated not obscurely in the map attached to the Cholera Report for 1866-68. I had the opportunity, while the report was passing through the press, of watching in its revitalisation the cholera dormant within the area so mapped out, and from the spring manifestations of 1869, the conclusion, that the value in epidemic history of the cholera of 1868 had been correctly appreciated, and that within the circumscribed area of the previous year the materials for a far-spreading epidemic were pent up, could not be avoided.

Never hitherto has it fallen to us in India to study on a basis of facts such as has been afforded in 1868 and 1869 the cholera of any epidemic. The anticipations regarding the chief events of the year were put on record in June 1869, and the Government of India, alive to the vital importance of the enquiry, urged the employment of all machinery that might tend to elicit the truth regarding what was about to happen. The efforts of the provincial Sanitary Commissioners to ensure an accurate registration of the statistical facts among the general population were in 1869 attended with most satisfactory results, and the death-tables of the year depict with precision what actually occurred over Central and Northern India. The reports of districts coincide with the facts as recorded in the registration tables, and the tables and reports for the armies and jail population repeat what is true for provinces and districts. This last fact has been true in all past epidemics, as is proved by a study of the types in relation to the general reports from districts; but, because the actual statistical data could not be produced for the population generally, a handle was afforded to some, who, knowing nothing of the truths of epidemic history, did not hesitate to make the unfounded assertion, that the teaching of the type was opposed to the facts as exhibited among the population as a body.

The elaborate care bestowed by Dr. Townsend in the investigation of the cholera of his province of 1868, as recorded in his published report on the cholera of the year in the Central Provinces, places us in a position to affirm as a fact that the geography of the cholera of 1868, as well as the intensity of the epidemic over the different portions of the area covered, was actually as it was represented to be in the report of last year. It was upon the tract under the jurisdiction of the Sanitary Commissioner for the Central Provinces that the invading cholera of 1868 chiefly fell. The district mortuary registers show also that the cholera area of 1868 included the valley of the Ganges, and was defined by a curved line stretching from the Oude Terai to Malwa, or even further to the west.

It was the occupation of the tract which I have termed the southern epidemic highway which raised apprehensions for Western and Northern India. Knowing the extreme unwillingness of cholera to cross the Doab, I anticipated no danger of invasion in Rohilcund, Meerut, or the Punjab, until the tract south of the Jumna exempted in the invasion of 1867 was once more re-occupied; and when, in the spring of 1869, cholera settled over this tract, then we knew that the journey of the epidemic of 1868-69 on the northern epidemic highway was begun. The history of the advance on the two highways falls to be considered in this report. I shall have to trace the two limbs of the epidemic, extending the northern into Russia, the southern into Eastern Africa. These two extensions are what, in my previous reports, I have called "limbs," in trying to show how the epidemics of the past fifty years have invaded beyond the limits of Hindostan. After the occupation of the southern highway in 1868 and the revitalisation of cholera over Central India in the spring, I suggested the probability of the invasion of Eastern Africa at the end of 1869 or in the early months of 1870 by the cholera epidemic over the Central Provinces, now nine months ago; and while I write, Eastern Africa is being ravaged by cholera, first announced by Dr. Kirk, of Zanzibar, in a despatch dated 24th November. The history of the journey on the northern highway ending in the cholera of Kieff, I shall not here anticipate. The Sanitary Commissioner for Burmah has been employed in studying the extension of this same epidemic eastward, from the eastern margin of the endemic basin; for his province, and also Assam up to the north-eastern frontier, have been stricken by this same epidemic of 1868-69.

In the pages which follow, I shall, first, briefly recapitulate the leading facts in the history of the cholera of 1868 and of the spring of 1869, and place in connexion with this history the anticipations furnished to Government relating to the probable movements of this cholera in Upper India in the months succeeding; next, I shall try to frame into a narrative the cholera history of 1869, and show the extent to which the anticipations formed were realised; and, finally, I shall notice the aspects of the cholera of the year as displayed in relation to communities.

ARRANGEMENT OF THE REPORT.

Part I.—Recapitulation of the leading facts in the cholera history of 1868 and connected with the renewal of cholera in the spring of 1869, and the anticipations formed regarding epidemic movement between June and September.

Part II.—The history and general aspects of the epidemic cholera of 1869.

Part III.—The aspects of the cholera of 1869 as shown on the affection of communities.

PART I.

RECAPITULATION OF THE LEADING FACTS IN THE CHOLERA HISTORY OF 1868 AND CONNECTED WITH THE RENEWAL OF CHOLERA IN THE SPRING OF 1869, AND THE ANTICIPATIONS FORMED REGARDING EPIDEMIC MOVEMENT BETWEEN JUNE AND SEPTEMBER.

The map of 1868 was drawn up from the experience of the types of the population, and from the registered deaths of the general population as shown in tables at pages 148, 149, and 153 of the Cholera Report of last year. The registration of Oude was not available when this map was constructed, but since then I have received details for this province from September 1868 and a general estimate of the cholera deaths for the previous months of the year.

Taking the registration of the North-Western Provinces alone, the line bounding the epidemic cholera of 1868 on the west was clear and well defined. Out of a total of 16,192 cholera deaths in these provinces, 13,777 occurred in Allahabad and the districts lying to the east and north, and the remaining 2,415 were distributed over the whole area lying west of Allahabad. So sharply was this line defined that the district immediately to the west of Allahabad gave but 88 deaths, and Cawnpore, 145 miles to the west, 67 deaths; and passing further to the south and west, the vast tract comprising the districts of Etawah, Jaloun, Humeerpore, Banda, Jhansi, and Lullutpore, with a population estimated at 2,882,949, gave but 36 cholera deaths over the whole.

Western limit in the North-Western Provinces of the invading cholera of 1868.

It was towards the foot of the Himalayas that the cholera of 1868 appeared in its greatest strength. The districts of Goruckpore and Bustee registered 4,559 cholera deaths, and it is in connection with the cholera of this tract that it is now necessary to refer to the cholera deaths registered in Oude in 1868. It is the tract in the north of Oude that shows the continuation of the epidemic from the east. The districts of Southern Oude suffered as little as Futtehpore, Cawnpore, and Futtehghur, the adjoining districts of the North-Western Provinces:—

Supplementary details regarding the province of Oude, and the corrections required in the map of 1868 in relation to these details.

Statement showing the epidemic connections of the Cholera of Oude of 1868.

CHOLERA DEATHS OF THE GENERAL POPULATION, 1868.

Allahabad and Districts to the North.		Northern and Eastern Oude.		Southern Oude.	
Allahabad	622	Sultanpore	883	Pertabghur	108
Jounpore	1,104	Fyzabad	941	Rae Bareilly	163
Azimghur	1,554	Gondah	774	Oonao	119
Goruckpore and Bustee ...	4,559	Seetapore	851	Lucknow	256
		Baraich	356	„ City	150
		Kheree	40	Nawabgunge	110
				Hurdui	199

This cholera we now know from the events of 1869 to have been an invading cholera. The westward extension in the north of Oude is likely to be of importance in shaping out the geography of future epidemics; and therefore it is right that the map of 1868 should be corrected in as far as it does not show this extension.

And this is to be observed. If the line of western extension in the north be placed further west, and if the results of the registration of the Central Provinces be at the same time carefully mapped, the eastern area covered by the invading cholera of 1868 will appear very little different from the areas mapped out in the corresponding years of invasion, namely, 1855, 1859, and 1863.

Western and northern limit of the bounding line of the invading cholera of 1868 in the Central Provinces.

The curved line which on the map indicates the limit of the invading cholera of 1868 in the west, skirts the exempted tract south of the Jumna above referred to. Intensity of manifestation in this western limiting line ceased at Saugor, and even at this point the cholera which prevailed up to the end of 1868 was important rather as a proof of invasion and as a forerunner of a cholera about to appear in 1869, than in its effects upon the population, for in the Saugor and Dumoh Districts only 290 deaths from cholera were registered throughout 1868. It was in the monsoon season of 1868 that these districts were invaded, and it was not until late in December (20th) that attention was called to the occurrence of the first case in the Bhopal State, a few miles to the south and west of Saugor, which proved the forerunner of a great cholera developed in the spring of 1869. Clearly defined as was the margin of this line stretching from Allahabad to Saugor, it is of extreme interest in the history of this epidemic to note the fact that our indices marked cholera in single sporadic cases over an enormous area in the very week of 1868 in which the first European soldier was struck down in Saugor. In Chanda the first notice of cholera was on the 15th August, in Ellichpore on the 18th, and at Malligaum in Khandeish on the same day. At Morar a single fatal case occurred in the same week in which the case occurred at Saugor; on the 20th a case occurred at Meerut, and a few days before (14th) a case was reported from Agra. To the possible significance of this cholera I have alluded at page 152, and the sequel in 1869 seems to show that the suggestion then offered represented what actually did occur. In many, perhaps in nearly all districts of the Central Provinces, cases of cholera had occurred before this date, in connexion with the spring invasion from the east. It is most remarkable that after the south-west monsoon had set in, no progress was made by this eastern cholera except apparently in the one week indicated. Even up to the end of 1868, Hoshungabad, Baitool, and Nimar had registered but 34 fatal cases, while the tract of the Central Provinces invaded in the spring afforded during the same period 7,200 cholera deaths. Nor is it to be supposed that the tracts exempted were those least liable to cholera. There are not in India areas more liable to the ravages of cholera than Nimar and the Chutteesghur Division of the Central Provinces, and both were ravaged throughout their extent by the revitalised cholera of 1869.

Line limiting on the east the tract of the Central Provinces invaded in 1868.

If the line of the west was definite, not less clearly defined was the line cutting off the great cholera of Jubbulpore, Mundla, and Seonee from the exempted tract of 1868 lying immediately to the east,—the worst cholera tract in India. Eight cholera deaths is the sum of the registration of the Chutteesghur Division for 1868, which in 1869 afforded 20,000 deaths out of its sparse population. As cholera prevailed along the northern margin of the mapped area of 1868, and had no power to enter the tract south of the Jumna, which in 1868 afforded 36 cholera deaths and in 1869 eleven thousand (10,975), so on the southern and south-eastern margin, the efforts of this great cholera, sitting in all its strength from April to December, and with every opportunity afforded to it except the presence of what was actually essential to its progress in this one given direction, were harmless for evil. A year later, 11th May 1869, the season came round in which the essential was afforded, and the sessile cholera made its leap into the unoccupied and congenial area.

Extension from the north-east into the Bombay Presidency of the invading cholera of 1868.

Reasoning from the fact of the arrival of a cholera recognised as invading, with the setting in of the north-east monsoon, on 15th October at Bombay, and on 15th November at Hyderabad in the Madras Presidency, I felt justified, although ignorant of the results of the registration of the included area, in covering with yellow the whole country lying to the south-west of the Central Provinces of the Bengal Presidency. The registration for the districts of this tract as given in the report of the Sanitary Commissioner for Bombay for 1868 bears out this anticipation in a wonderful manner, and when tacked on to that for the adjoining districts of the Central Provinces, the continuity of the geography of the cholera of the two Presidencies is perfectly demonstrated, and the history of the invasion is capable of being read.

The Sanitary Commissioner for Bombay writes,—

"Ahmednuggur appears to have been the district primarily visited and most severely ravaged by the disease, which extended into, and caused large mortality in, the contiguous Khandeish District northward, and the Poona, Sholapoor, Sattara, Kulladghee and Belgaum Districts southward. August, September, October and November were the months in which the disease was most rife.

"An effort was made to track the disease in its epidemic course from its entrance into the Ahmednuggur Collectorate; but the circumstances of sporadic fatal cases of cholera constantly occurring in the Ahmednuggur and other districts, and the impossibility of obtaining trustworthy information, rendered the attempt totally futile."

Geographical arrangement of the deaths from cholera registered in the Bengal and Bombay Presidencies.

The cholera deaths of 1868 seem to me to arrange themselves naturally as is shown in the table which follows :—

Cholera Deaths Registered among the General Population of the Bengal and Bombay Presidencies in 1868.

DISTRICTS.	Estimated population.	CHOLERA DEATHS REGISTERED IN EACH MONTH.												Total deaths of the year.	Death-rate per 10,000.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
EASTERN DISTRICTS OF THE N. W. PROVINCES.															
Ghazeepore	1,332,403	51	33	123	166	145	353	245	378	327	241	87	66	2,215	16·62
Benares	793,277	20	30	169	171	228	444	140	78	70	33	35	15	1,433	18·06
Mirzapore	1,054,413	27	17	601	342	675	434	123	19	29	4	16	3	2,290	21·72
Azimghur	1,385,872	48	27	23	55	188	102	258	248	264	219	46	76	1,554	11·21
Jounpore	1,015,427	5	7	41	169	195	111	120	336	77	35	6	2	1,104	10·87
Goruckpore and Bustee ..	3,439,513	175	28	35	399	592	762	1,165	937	340	97	29	...	4,559	13·25
Allahabad	1,303,183	24	7	12	56	119	55	204	58	28	9	14	36	622	4·46
Futtehpore	680,786	40	3	4	2	9	20	4	1	2	...	1	2	88	1·28
Cawnpore	1,188,902	...	1	11	5	4	9	10	6	5	8	4	4	67	·56
Futteghur	915,913	7	11	13	6	23	8	7	13	11	...	2	1	102	1·11
DISTRICTS OF OUDE.*															
Sultanpore	930,023	...	...	..	...	..	..	...	...	...	...	...	...	883	4·42
Fyzabad	1,437,409	...	...	...	...	..	...	...	...	...	...	...	...	941	
Gondah	1,167,810	...	...	...	...	...	...	...	...	...	...	...	...	774	
Seetapore	930,224	...	...	...	...	...	...	...	...	...	...	...	...	851	
Baraich	774,437	...	...	...	..	...	...	...	...	...	...	...	...	356	
Kheree...	737,732	...	...	...	...	..	...	...	...	...	...	..	...	40	
Pertabghur	936,053	...	...	...	..	...	...	...	...	...	...	...	...	108	
Rae Bareilly	782,874	...	...	...	...	...	...	...	...	...	...	...	...	163	
Oonao	724,940	...	...	...	...	...	...	...	...	...	...	...	...	119	
Lucknow	697,499	...	...	...	.	...	...	...	...	...	...	...	...	256	
" City	273,126	...	..	...	...	.	...	...	...	...	...	...	...	150	
Nawabgunge	875,376	...	...	...	...	..	...	...	...	...	...	...	...	110	
Hurdui...	930,977	...	...	...	...	...	...	...	...	...	...	...	...	199	
DISTRICTS OF THE CENTRAL PROVINCES.															
Raepore	586,118	...	...	1	...	...	...	...	...	...	2	...	...	3	·06
Belaspore	530,541	..	1	...	2	1	1	...	...	.	...	...	...	5	
Sumbulpore	268,295	...	...	...	...	...	...	...	...	...	...	...	...	...	
Jubbulpore	539,106	7	7	1	2	148	671	1,520	542	41	13	...	...	2,952	54·76
Seonee	421,650	2	2	5	4	150	414	742	291	17	5	5	1	1,638	38·85
Mundla	217,264	...	1	...	...	9	263	567	209	21	4	...	...	1,074	49·43
Nursingpore	340,356	2	...	...	...	...	78	250	175	68	2	3	...	578	16·84
Dumoh...	280,554	2	1	...	3	3	5	5	1	1	9	...	4	34	1·21
Saugor	490,636	...	3	1	...	2	3	22	68	128	23	6	...	256	5·22
Chindwarra	260,913	...	...	1	1	...	...	5	45	1	...	2	...	55	2·11
Baitool	254,915	1	3	...	...	...	...	...	14	...	...	...	1	19	·75
Hoshungabad	427,056	...	...	...	1	..	...	1	...	...	...	...	...	2	·05
Nimar	166,882	...	...	1	...	2	...	1	...	...	8	...	1	13	·78
Bhundara	608,480	...	...	...	...	..	...	55	86	1	...	...	...	142	2·33
Nagpore	558,119	...	...	...	4	3	92	120	50	14	8	...	...	291	5·21
Balaghat	173,121	...	...	...	...	7	21	27	46	5	4	...	1	111	6·41
Wurdah	176,228	...	...	...	2	8	12	73	172	74	23	6	...	370	21·00
Chanda	414,869	...	...	...	...	...	...	30	19	...	...	...	...	49	1·18
SOUTHERN DISTRICTS OF BOMBAY PRESIDENCY.															
Ahmednuggur	995,585	12	2	7	7	7	27	346	529	405	308	122	30	1,802	18·10
Poona	623,949	...	1	2	1	9	6	4	60	276	215	100	8	686	10·99
Sholapore	552,928	2	...	1	1	4	...	3	1	145	489	113	20	779	14·09
Sattara...	972,431	..	2	...	...	...	...	...	...	72	350	180	53	657	6·76
Kulladghee	691,425	1	4	4	4	...	...	...	...	7	176	116	8	320	4·63
Belgaum	780,358	...	...	...	...	...	...	..	...	...	209	69	85	363	4·65
Dharwar	816,980	...	...	2	...	...	...	...	...	...	...	...	...	2	·02
WESTERN DISTRICTS.															
Khandeish	1,024,156	5	13	...	...	4	4	11	229	244	18	24	1	553	5·40
Bombay City	816,562	1	...	1	3	3	2	3	7	1	33	60	104	218	2·67
Tanna	864,021	...	1	..	4	...	1	...	12	10	159	218	64	469	5·42
Surat	492,684	...	5	11	2	2	2	15	2	...	4	18	60	121	2·46
Ahmedabad	236,782	...	...	2	4	3	1	...	...	...	...	...	...	10	.....
Broach	161,893	1	3	...	2	1	...	...	2	...	...	...	1	10	......
SCINDE.															
Kurrachee Collectorate	1,896,765	23†	...	...	...	...	...	...	...	...	...	...	...	23 †	......
Other Districts of Scinde		...	...	...	...	...	...	...	...	...	...	...	...	None	

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* The registers are incomplete for the first half of 1868, the monthly details are therefore omitted.

† The winding up of the cholera of 1867.

Cholera Deaths Registered among the General Population of the Bengal and Bombay Presidencies in 1868,—continued.

DISTRICTS.	Estimated population.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total deaths of the year.	Death-rate per 10,000
		CHOLERA DEATHS REGISTERED IN EACH MONTH.													
DISTRICTS OF N. W. PROVINCES SOUTH OF OR BORDERING ON THE JUMNA.															
Banda	724,372	1	3	2	2	...	...	...	...	...	...	...	...	8	.12
Humeerpore	520,941	1	...	...	...	1	2	1	...	...	...	...	...	5	
Jaloun	405,272	...	...	...	...	...	1	1	...		...	8	1	11	
Etawah	626,444	1	...	4	...	2	1	3	...	1	...	...	...	12	
Jhansi	357,774	...	...	...	...	...	...	...	...	...	...	...	...	..	
Lullutpore	248,146	...	...	...	...	...	...	...	...	...	...	...	...	...	
DISTRICTS OF THE N. W. PROVINCES LYING WEST OF THE LINE OF 80 E. LONG.*															
Bareilly	1,464,199	28	18	46	88	62	41	28	56	27	88	40	9	531	1·58
Budaon	889,810	1	12	12	8	9	10	11	16	11	8	13	3	114	
Shahjehanpore	918,850	5	8	...	1	1	2	5	5	6	8	2	...	43	
Moradabad	1,095,308	13	12	10	10	20	20	7	5	10	12	8	10	137	
Etah	614,351	3	4	4	8	4	4	8	3	6	5	7	5	61	
Mynpoorie	700,220	3	8	4	16	2	21	9	2	5	5	8	2	80	
Allyghur	925,538	9	14	5	8	6	4	11	11	16	12	7	3	106	
Bulundshuhur	800,481	3	4	2	12	12	9	...	22	23	8	1	6	102	
Agra	1,028,544	1	8	5	10	12	12	6	8	5	7	4	...	78	
Muttra	800,321	4	3	6	10	13	14	50	10	5	6	4	3	128	
Meerut	1,199,593	8	8	9	12	13	40	33	18	153	7	8	9	318	
Mozuffernuggur	682,189	21	11	49	7	22	36	34	17	10	4	8	9	228	
Seharunpore	866,483	5	16	9	24	21	11	16	8	4	9	3	12	138	
Bijnour	690,975	1	1	2	2	...	8	4	5	3	3	5	4	38	
Deyrah	102,831	...	...	...	...	2	1	2	...	...	...	...	...	5	
Terai Pergunnahs... ...	91,802	...	...	1	2	...	...	...	...	...	...	...	...	3	
Kumaon	385,790	...	...	...	...	...	...	2	...	...	...	...	...	2	
Ghurwal	248,742	11	6	...	2	1	...	...	...	...	...	...	...	20	
PUNJAB.															
Goorgaon	690,522	2	...	...	4	7	5	1	...	1	2	...	1	23	·30
Delhi	602,633	...	1	1	...	2	1	3	1	.	...	2	...	11	
Rhotuk	536,995	...	...	...	1	...	1	...	...	...	...	1	...	3	
Hissar	484,681	1	...	...	...	...	...	...	2	1	...	...	...	4	
Sirsa	210,795	...	...	1	1	1	..	1	1	...	...	...	...	5	
Kurnaul	610,927	2	3	3	2	...	3	2	6	5	1	...	1	28	
Umballa	1,008,952	6	1	5	4	7	5	3	1	...	3	...	...	35	
Simla	26,402	...	...	...	...	...	...	...	...	...	1	...	...	1	
Jullundur	783,020	5	...	1	...	1	3	1	...	...	...	1	2	14	
Loodianah	583,445	...	2	...	1	...	2	...	...	...	...	...	...	5	
Hoshiarpore	938,890	5	1	1	...	6	2	1	...	1	...	...	...	17	
Kangra	744,162	3	6	1	2	3	5	5	3	14	65	8	4	119	
Goordaspore	906,126	8	4	4	3	...	...	...	...	...	...	...	...	19	
Sealkote	994,458	1	...	4	...	...	2	1	2	2	...	...	...	12	
Umritsur	832,750	5	3	1	8	28	14	12	11	6	3	4	...	95	
Goojrat	616,347	2	...	3	4	3	5	1	5	2	5	2	5	37	
Goojranwalla	550,576	3	1	1	1	3	4	5	5	1	...	1	...	25	
Lahore	775,551	...	...	...	1	2	1	1	...	1	4	1	...	11	
Ferozepore	533,416	...	...	2	2	1	2	1	1	2	...	1	1	13	
Montgomery	359,437	...	...	...	...	1	...	1	...	...	1	...	...	3	
Mooltan	459,780	...	...	...	...	...	...	...	...	...	...	..	...	...	
Mozufferghur	295,547	..	...	...	...	...	...	...	...	1	...	...	...	1	
Dera Ghazee Khan ...	305,903	...	...	...	...	...	...	...	...	...	...	...	...	...	
Dera Ismael Khan ...	389,533	...	...	...	...	...	...	...	...	...	...	...	...		
Jhung	348,027	...	...	...	...	...	...	...	...	...	...	...	...	...	
Shahpore	368,796	2	1	...	...	...	2	...	...	...	...	...	...	5	
Jhelum	500,988	...	...	...	9	1	1	2	...	...	..	1	...	14	
Huzara	364,324	...	1	1	...	2	2	...	3	...	...	1	...	10	
Rawul Pindee	690,647	...	...	...	...	...	...	...	...	..	...	...	...	...	
Peshawur	408,479	3	2	2	1	3	3	2	...	...	...	1	2	19	
Kohat	140,209	...	...	...	...	...	1	...	...	...	...	...	...	1	
Bunnoo	287,547	...	...	...	...	...	...	...	...	...	...	...	1	1	

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* A large proportion of the deaths registered in this area are erroneously attributed to cholera. See the remarks by the Civil Surgeons of the districts regarding the registration of 1869, p. 207.

In this table I have brought together the results of the registration of the Bombay Presidency and of Central and Upper India, maintaining the geographical arrangement of the different districts which I consider to be the natural one; and this table illustrates what I have written above regarding the geographical relations of cholera in 1868.

Meteorology in relation to which the movement from north-east to south-west occurred.

And before going further we may enquire what are the meteorological conditions under which an air-conveyed cholera, recognised even by those who attribute the introduction to human agency, as entering the invaded area of the Central Provinces from the north-east, makes its appearance and progress. I find that I have answered this question in notes at pages

154 and 155; and, judging from the history of the meteorology attending this and other occasions on which epidemic cholera has crossed the continent, I have drawn the inference that the capability of epidemic advance in the monsoon season from north-east to south-west, that is from Seonee, Mundla, and Jubbulpore towards Ahmednuggur, is exactly proportionate to the extent to what meteorological influences having as their base the north-east take the place of those having the Bombay coast for their base. That, in short, repression of the south-west monsoon will cause a cholera which we can recognise as epidemic in the north-east to descend towards the south and west to fill the vacancy left owing to the absence of the influences from the south-west normal for the season.* The line from north-east to south-west followed in 1868 was an aerial line, as the geography indicated in the table on the previous page clearly shows. The influences from the Bay of Bengal pressing steadily on the eastern flank of the cholera kept it entirely out of the Chutteesghur Division; the monsoon blowing up the vallies of the Nerbudda and Taptee pressed on it from the west; and hence resulted precisely the shape which we see on the map, or even in looking at the figures in the table below and knowing nothing of the geographical relations involved:—

Table illustrating how Cholera moves from North-east to South-west upon the Southern Epidemic Highway.

DEATHS OF THE GENERAL POPULATION, 1868.

Movement repressed by eastern influences from the Bay of Bengal.		Districts in the line of epidemic movement from north-east to south-west.		Movement repressed by western influences from the Bombay Coast.	
Raepore ...	... 3	Jubbulpore ...	... 2952	Bhopal ...	... 1
Belaspore ...	... 5	Mundla ...	... 1074	Nimar ...	... 13
Sumbulpore ...	None	Seonee ...	... 1638	Hoshungabad ...	... 2
		Saugor and Dumoh	... 290	Baitool ...	... 19
		Nursingpore ...	... 573		
		Nagpore Division	... 963		
		Ahmednuggur ...	... 1802		
		Poonah ...	... 686		

Termination of the epidemic journey commenced in April 1868.

The cholera invading in the spring and making the further advances above described, lay thus in the invaded tract at the close of the monsoon of 1868. The devitalisation or dormancy of this cholera was then due, and it took place as I have shown at page 155, over the whole area of the Central Provinces invaded in the first nine months. But even in October the head of the cholera invading the Bombay Presidency retained vitality, owing probably to its meeting the moisture derived from the Indian Ocean; and when the north-east monsoon set in, this cholera reached Poona and Bombay and showed itself also in the Nizam's territories at Hyderabad.† But even in the city of Bombay the mortality was trifling. The deaths of the city in the last four months of 1868 was as follows:—September 1, October 33, November 60, and December 104. There is, I think, little doubt that this cholera was in a great measure repressed, and prevailed at a season when, had its journey ended elsewhere, it would naturally have been dormant. This seems to me to have been a cholera which had for the time revived from finding itself at sea level and in a region bearing some resemblance to its endemic habitat. When I have spoken of a cholera reasserting vitality about the 20th February, it is with reference to a cholera of a region of certain physical attributes that I have spoken. When we arrive within about 200 miles from the western coast in the north of the Bombay Presidency, we expect to find cholera reappearing at the same seasons as in the valley of the Ganges, while farther to the north the spring manifestation proper is repressed up to the end of April or the first week of May.

Offshoot into the northern epidemic route in December 1868.

I have suggested the possibility (p. 87) that a dormant as well as a vitalised cholera may be actually distributed, or in other words, that choleraic influence may generally pervade a region of any extent and manifest its presence by effects so trifling as to be recognised only when specially enquired after among the population, whose deaths are to be reckoned by units in place of by thousands, because of the moving epidemic being distributed at an abnormal season. I refer to this here that I may make mention of the cholera of our Presidency of the last days of November and of December in 1868. I have mentioned the single case observed by the Civil Surgeon of Bhopal, and, at page 151, I have spoken of the possible meaning of a single case observed at Morar on the 27th December. These, and the case of the 26th Regiment of Native Infantry which was attacked while marching south of Goonah, led me to draw the inference, that an offshoot of cholera was directed along the northern epidemic route at this time. This observation has been strengthened by the investigation of Dr. Moore of the Rajpootana Agency, who, guided by this remark, found that cholera did appear at this time in Rajpootana, near Beaur. And yet again, it is very important in connection with the history of this cholera in Persia in 1869, to note that on 10th December the Medical Officer of the Persian embassy reports that "several cases of cholera are reported to have taken place in Teheran during the last three weeks."

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* In connection, see remarks at page 228 of this report.

† Dr. Edward Balfour, Deputy Inspector General of the Hyderabad Force, informs me that he distinctly recognised this as an invading cholera, coming after the setting in of the north-east monsoon.

The relation of the cholera of the invaded tract of 1868 to the uninvaded tract, the western division of the epidemic area.

This rapid sketch will suffice to show the geography of the cholera of the new epidemic up to the end of 1868, and the degree of virulence manifested over the different parts of the area occupied. Virtually, Northern India was an exempted area in 1868; as, indeed, was the whole of the natural tract which I have described as the western division of the epidemic area, and also the pathway leading directly into it, which is the tract south of the Jumna. Two shadows had been thrown over this western epidemic area—the one of the third week of August, the other of the last weeks of the year confined to the south and west of the epidemic highway. But it was the dark shadow lying across the epidemic tract leading into Northern India that told of invasion to follow in 1869, and it was in anticipation of the consequences of this invasion that the following warnings were given to Government before the events occurred, or in explanation of the phenomena of epidemic progress in 1869.

Invasion from the same endemic source from south-west to north-east towards the Assam Frontier.

From the imperfect information at my disposal regarding the cholera of Eastern Bengal and Assam of 1868, I was inclined to believe that an offshoot from the same endemic source which originated the epidemic of the Central Provinces had been projected from south-east to north-west as far as the Assam Frontier. In this conjecture I may have been wrong, and there is neither record nor registration to help us over the difficulty. But if the forerunners of invasion were not thrown out in 1868, invasion commenced at the earliest possible date in 1869, and cholera was epidemic in Lower Assam by the 20th February.

In the last three months of 1868, the general prevalence of cholera over Eastern Bengal indicated something beyond the manifestation usual at this season; for, from Akyab to Mymensing, cholera was universal at this time. This furnished the base whence the great invading cholera of Assam departed towards the north-east.

Revitalisation of the invading cholera of 1868 in the spring of 1869.

Throughout the report on the cholera of 1868, the cholera existing was asserted to be a new cholera and an invading cholera, destined to have a life period in Upper India beyond that of its present existence, and not likely to terminate in the year of primary invasion. As regards the invasion of the Central Provinces, I wrote as follows (p. 147):—"We recall the invasion from the east of the cholera of 1863, and the gate by which we traced it entering to become the great cholera of the Central Provinces of 1864 and 1865. * * The infection of these same districts early in 1868, added to the indications of the bursting forth of cholera from within the endemic area, leads me to believe that in the phenomena we cannot but recognise the succession of a new invasion to that of 1863, and one not due to any portion of the cholera of 1866 and 1867." The invading cholera of 1868 of the Central Provinces furnished a register of 7,592 deaths; in 1869, the year succeeding the invasion—the year of revitalisation—the number of cholera deaths registered was 55,897. Very early in 1869, it was evident that the cholera from the east had finished its journey along the tract which I have called the southern epidemic highway. In Nimar and Hoshungabad cholera existed even in January, and 64 deaths were reported from these districts; and towards the end of February cholera became revitalised in many districts of the Central Provinces.

The statement on page 155 carries up the narrative to 3rd April 1869; and the parallel passage relating to the reappearance of the cholera of 1863 in February and March 1864 over the same area will be found at page 120, in which the state of the districts up to the 28th March 1864 is reported upon. At the very earliest date at which it could reappear, cholera became epidemic in the extreme west of the Presidency; thus, at Sirdarpore it was on the 10th March that the epidemic commenced. But a month earlier than this the Military Authorities at Goonah reported cholera to be prevailing in various gangs of labourers in the vicinity—a cholera derived probably from the invasion of December; for it is not to be overlooked that it was here that the 26th Regiment of Native Infantry got cholera on the last days of November in 1868. This was the first appearance of a great cholera which covered Central India Proper up to August. By the end of March cholera had begun to show itself in Gwalior. Major Thomson, writing regarding the drainage of Morar, says:—"As soon as rain fell, which it did towards the end of March, the ground began to steam, and the European troops were attacked with cholera." In relation to this observation, it is of importance to recall the single case of cholera at Morar in the end of December, and the anticipations founded upon the fact of its occurrence,—page 151. It was about the 12th April that cholera showed itself at Ajmere, and regarding the opinion which I offered as to the epidemic relations of this cholera, Dr. Moore observes:—

"If Dr. Bryden's theory is correct, the cholera of Rajpootana in 1869 must have been a 'revitalisation' of a former epidemic. And here I am bound to mention a fact apparently corroborative of his argument. At page 151 of his report, Chapter VII headed

"Characteristics of the year 1868 on the northern epidemic highway," the following note appears: "The occurrence of cholera in Ajmere (in April 1869) might be considered by some only as caused by a northern extension of the cholera of Malwa of November and December, but I attribute to it a significance beyond this. I think it not improbable that an offshoot of southern or south-eastern cholera was directed into this route in December 1868, which is now becoming manifest." And a reference to the map shows cholera occurring in the Burr Pass in the month of November 1868, and this must be regarded either as a remarkable coincidence, or otherwise as directly supporting Dr. Bryden's opinions."

Significance of the geography of the revitalised cholera of the spring of 1869.

It is, I think, a point of vital importance in dealing with the history of the epidemic of 1869, to keep clearly in view the history of the movements of 1868 and the manifestations of the early months in the east, in the Central Provinces, and far to the west in Malwa and Rajpootana. These teach us how cholera skirting round far to the south found its way by the circuitous route of the southern highway to the extremity in our Presidency of the northern epidemic highway, leaving all the eastern portion of the same northern highway unoccupied for a whole season, from Ajmere eastward to the parallel of Allahabad. The occupation of the northern highway by the eastern cholera at the normal season in 1869 is to be studied as regards all its phenomena apart from this appearance of cholera at its western extremity. The invading cholera must be found entering the exempted area south of the Jumna from the east, and progressing along the northern highway until mingled inextricably with the cholera of November 1868, revitalised in March and April 1869. And intimate although the blending be, we shall, I think, be able by consulting the history of previous epidemics to show clearly that in dealing with both we are dealing with two things tangibly distinct.

First movement from out of the area covered in 1868. The occupation of the tract lying south of the Jumna.

The yellow patch of 1868 lay across the epidemic highway. The track of the cholera of 1868 must of necessity be crossed by influences from the Gangetic Provinces or from the Bay of Bengal seeking to reach the western division of the epidemic area; and we looked anxiously forward to the occurrence of cholera within the area exempted in 1868, knowing that the spring cholera was due in these districts, and that about the 20th May movement was to be dreaded, as in former epidemics, for an indefinite distance along the highway.

The Sanitary Commissioner for the North-Western Provinces was requested to forward intimation of the fact in the event of Jhansi, Lullutpore, Humeerpore, Jaloun, or Banda being invaded from the east in the spring. The event turned out as below tabulated:—

Occupation of the Eastern portion of the Northern Epidemic Highway in the spring of 1869.

REGISTERED CHOLERA DEATHS AMONG THE GENERAL POPULATION.

		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November	December.	TOTAL.
1868	Jhansi ...	...	...	...	...	...	...	...	...	...	...	...	...	None.
	Lullutpore...	...	...	..	...	...	...	...	...	...	...	...	...	None.
	Humeerpore	1	...	...	...	1	2	1	...	...	...	...	...	5
	Jaloun ...	...	...	...	...	...	1	1	...	...	...	8	1	11
	Banda ...	1	3	2	2	...	...	...	...	...	...	...	...	8
1869	Jhansi ...	...	...	...	1		35	163	1,438	152	5	..	...	1,794
	Lullutpore...	...	..	...	...	20	1,186	779	479	219	13	6	...	2,702
	Humeerpore	...	...	1	...	32	55	759	957	212	39	4	...	2,059
	Jaloun ...	...	...	2	3	36	571	319	1,250	322	75	...	...	2,578
	Banda ...	...	...	.	221	123	410	197	321	36	86	...	...	1,393

Anticipations grounded on the geography of the cholera of the spring of 1869 after the first movement of the year had occurred.

What followed in Northern India will be explained afterwards. Movement on the northern highway did occur as anticipated and at the date of our anticipation; and it became necessary for the Sanitary Commissioner to give warning of what was threatened in Northern India when the limiting line on the west of the yellow patch of 1868 was broken through.

On 18th June, the Sanitary Commissioner addressed the Government of India in the following letter, from which those parts only are omitted which had reference to special sanitary arrangements that might be required to meet the emergency:—*

Letter from the Sanitary Commissioner in anticipation of the movement of cholera over Northern India with the monsoon of 1869.

"The occurrence of cases of cholera which have been reported during the last few weeks among the troops at the stations of Dinapore, Allahabad, Seetapore, Fyzabad, Agra, Morar, Saugor, Jubbulpore, and Jullundur shows that the area under epidemic influence is of wide extent, and leads to the most serious apprehensions that the disease may become more prevalent later in the season. When the facts of the case are compared with what took place in 1856 and 1861, these apprehensions become still more serious, and there is grave reason to fear lest the very great loss of life which occurred in those years may be repeated in 1869.

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* This letter appears at length in the Proceedings of the Sanitary Commissioner for 1869, page 593.

"In the accompanying memorandum Dr. Bryden has shown the parallel between the three years, and has pointed out the grounds on which he has reason to believe that a severe epidemic of cholera is to be dreaded. The point is also further illustrated in the annexed statement showing the daily number of deaths among European soldiers at the places attacked in 1856 and 1861.

"If the conclusions at which he has arrived after a patient study of the facts of previous years be correct, there is great reason to fear that the troops in the following stations will be invaded by cholera, and that in those of them where it has already appeared it will become more prevalent in the coming months of July, August, and September:—Allahabad, Cawnpore, Lucknow, Meerut, Delhi, Muttra, Agra, Morar, Jhansi, Saugor, Jubbulpore, Umballa, Ferozepore, Meean Meer.

"If this anticipation should prove correct, and if the disease should assume a virulence such as it showed in 1856 and 1861, the loss among European troops cannot fall far short of a full infantry regiment—not to speak of the casualties among women and children. In 1856, out of a strength of 21,304 British soldiers in the Bengal Presidency, 704 died from cholera. In 1861, out of 44,879, the deaths from the same cause were 1,065.

"Under these circumstances, I venture to bring the subject to the attention of the Government, in the hope that some measures for meeting the epidemic may now be devised, and that in the event of cholera attacking the stations indicated they may be carried into effect without delay.

"In the tables appended the statistics of cholera among European troops at ten different stations between the years 1859 and 1868 are given. From these it appears that at Allahabad, Cawnpore, Lucknow, Morar, Agra, Meerut, and Meean Meer cholera is invariably most prevalent in the months of July, August, and September; and that when a few cases (it may be but one or two) occur in the early months, they are almost always followed by an outburst later in the season, but that this outburst may occur even when no such premonitory cases have appeared.

"To these tables, which indicate some of the stations which suffer most persistently from cholera, I have added tables to show the remarkable immunity of Sealkote, Rawul Pindee, and Jullundur. To them may be added Roorkee, where there has been no fatal case among European troops since it was occupied; Mooltan, where there have been but two cases since 1859, both ending in recovery; and Campbellpore, in which no case has yet occurred among European troops.

"The benefits of moving into camp have, I believe, been sufficiently established, but the principle it involves might be carried out still further by endeavouring to move away from the infected area altogether. Our knowledge of the laws which govern cholera is not yet so exact as to enable us to say with anything approaching to certainty what the exempted area in any given case may be; but judging from the facts which are available, and setting all theories aside, there is good reason to hope that by moving troops into the neighbourhood of those places which have hitherto preserved such a remarkable immunity from the disease good results would follow. And I would therefore propose, for the serious consideration of the Government, that in the event of European troops being attacked at the stations in which an epidemic is anticipated, they should be moved to one or other of the localities indicated, in which experience has shown that they are more likely to escape.

* * * * * * * *

"I make these suggestions fully impressed that it is very difficult, perhaps impossible, to say beforehand what course the cholera may take, and to what extent it may prevail, and, further, that the measures recommended may prove a failure. I have therefore placed all the facts before the Government for their anxious consideration. If the fears for the European soldiers during the next few months should happily prove groundless, no action will be required beyond preparing to meet the danger. Should cholera prove epidemic, it is best that measures should have been taken beforehand, and that a decided movement in a definite and predetermined direction may be tried as the best means calculated to avert a very heavy mortality."

Thus the Sanitary Commissioner wrote in the middle of June, and at this time the printing of the first section of the Cholera Report was completed, and the following were the anticipations contained in the final paragraph:—

Geographical position of the cholera of the epidemic as recognised at the time when this letter was written.

"The cholera history of 1868 teaches us clearly what we have not been taught hitherto with sufficient precision, namely, the method in which the southern epidemic belt is crossed from sea to sea and the time occupied in the journey. It teaches that in the year of its breaking forth (from within the endemic province) cholera may have extended indefinitely to the west in India, and without the affection of our Northern Provinces having taken place at all. * * * The great cholera now in progress in the Central Provinces, and which is epidemic also over Guzerat, is the exact counterpart of the cholera of 1864 following the invasion of 1863; and we shall wait to see whether or not it is destined at the close of this year or in the spring of 1870 to transgress the boundaries of Hindostan and to make its appearance in Arabia or Syria or in Eastern Africa. The occupation of the northern highway has occurred in the spring of 1869; the forerunners have been thrown forward into Northern India as far as to Jullundur, Sealkote, Lahore, and Mooltan; and even those who know the phenomena of invasion only from personal and local experience recognise that the invasion of the Northern Provinces is imminent."

The printing of the second section of my report was not completed for some weeks later, and several months elapsed before it was submitted to Government; and during this period, in writing my anticipations, I was forced to quote at length several passages which I shall here omit, referring to them as they stand in the report itself.

The following is the memorandum which accompanied the letter of the Sanitary Commissioner of 18th June:—

Memorandum which accompanied the Sanitary Commissioner's letter of 18th June.

"All anticipations regarding the epidemic progress of cholera must be drawn from parallel history. In India parallels occur in such a form and repeat themselves so constantly that we have no difficulty in coming to the conclusion that they occur in obedience to natural laws. We study the sequence of events therefore not as if the occurrences were mere contingencies, but in relation to their subordination to natural agencies.

"The nature of the agencies which regulate distribution and the data from which the laws of distribution are deduced I shall not allude to. I shall simply state the facts of the geography of the epidemic now in motion, and place beside them the parallel facts of previous epidemics of which we know the career subsequent to the date on which they had a similar and parallel geography.

* * * * * * * * *

Here followed a sketch of the progress of the epidemic of 1868 and the spring of 1869, such as I have given above.

* * * * * * * * *

"Cholera does not appear in Northern India either by invasion or when awaking from a state of dormancy before the 20th April in any year. In the south the revival takes place some weeks earlier; and this cholera of revival, commencing in March, has universally reappeared over the tract affected in 1868.

"The cholera now prevailing over Jhansi, Agra, Gwalior, and parts of Rajpootana is immediately derived from the same emanation of endemic cholera; whether it be a portion of the south-eastern cholera of the Central Provinces or a direct movement out of the countries lying south of the Ganges and Jumna is a point of secondary importance. We want to know the significance of the invasion of Agra, Jhansi, and Morar in May with reference to the subsequent movement of the invading epidemic.

"I shall speak only of the invasion of our Presidency from 80° east longitude westwards, since this is the tract to which invasion is confined when cholera progresses to the north and north-west from the countries lying south of the Jumna. I do not say that invasion is not due this year in the Gangetic Provinces, in Oudh, and in the eastern half of the Doab; but the direction from which such a cholera invades is different, and the history of either provincial cholera must be separately considered.

"Invading cholera is repressed out of Northern India in May; and when invasion does take place in May it is represented in shadow merely. A cholera reappearing after invasion does occasionally appear in power as in May 1857 and May 1867; but with this question we have not to deal at present. I have to show, if the heralds of invasion have been thrown forwards, what may be expected in their rear.

"The following table illustrates the simple fact, that in the nine years 1858-66, 14 European soldiers died in the area now threatened with invasion in the six months from January to June; while in the three months following—July, August, and September—1,603 deaths occurred from cholera:—

European Army of Central India, Agra, Meerut, and the Punjab.

	CHOLERA DEATHS, 1858-66.	Died per cent. of total deaths.
January	...	...
February	...	...
March	...	...
April	1	·06
May	8	·47
June	5	·30
July	339	20·08
August	1,007	59·66
September	257	15·22
October	61	3·62
November	10	·59
December	...	...
		100·00

"To take an illustration from the experience of a single cantonment. In the case of Meerut the shadow of the spring cholera and the substance of the monsoon cholera has been represented in former years as follows:—

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1856	..	...	...	.	..	..	6	73	..		...	.
1857	...	...	...	...	..	.	..	1	6	...		.
1858	...	...	...	..			3	1		...		..
1861	...		...	1	1		88	27	..	1		
1862	...	...	...	1	...	1	24	26	..			.
1867	...	...	...	...	..	.		16	106	1		..

"It is about the 20th May that a cholera destined for the invasion of Meerut and the Punjab generally appears south of the Jumna and invades the Agra District. This was the case in 1818 and 1856 and in many intervening epidemics; and it was at this season that in the same districts the invading cholera of 1860 was revitalised in 1861 preparatory to the invasion of July."

* * * * *

Here followed a sketch of the epidemic history of 1856 and 1860 in the southern districts.

* * * * *

"In 1867, the cholera of the year first appeared at Morar on 30th May, but we have no right to conclude that because the monsoon manifestation was so trifling in 1867 in this station, the same thing will occur in this year. In 1867 Morar was on the edge of the epidemic area of the year, Jhansi being altogether beyond the epidemic boundary. In 1869, however, Morar occupies the centre of the area of invasion, as in 1856 and 1861.* There is only one circumstance that may possibly give a more favourable aspect to the monsoon cholera in this region. It is this, that extension has taken place far to the westward—how far we cannot tell, but if Persia is invaded before the close of 1869, such invasion will be only consistent with previous history.† Nusseerabad and Ajmere have been reached; and this, on every occasion, implies the uninterrupted spread of epidemic cholera from Bengal Proper to the extreme western limit of our Presidency. Had this limit not been reached, I should have dreaded the location of cholera in a position adapted for invasion and violent manifestation with monsoon influences even more than I do. For when a natural barrier stops the progress of cholera, it is apt to sink behind it in epidemic strength, while, if the sweep of the cholera wave is uninterrupted, diffusion frequently occurs in place of the settlement of the cholera. Thus a cholera progressing from the east in May showing its advance on what I have termed the northern epidemic highway, having manifested its presence at the gate of exit in the west of our Presidency, is less likely to be found in power two months afterwards than if no evidence of advance up to the western limit had been shown; since the very materies of the epidemic may have been removed, which, if the progressing miasm had been stopped in its westward career in the Agra, Jhansi, or Morar Districts, would have followed out the exact course of the epidemics of 1856 and 1860.‡

"The cholera of 1850 was such a cholera as I have described. Here was shown the affection of the Central Provinces, as in 1868, in the year preceding the appearance of the cholera on the northern epidemic highway. But this cholera made no progress towards the North-West in 1850; it affected Agra in 1851 and then progressed and was heard of in the spring of 1852 as the cholera of Kumaon and Ghurwal, and in September as the great cholera of Deyrah and Umballa, after which the epidemic died. * * * This cholera reached Ajmere while repressed out of the north-west of India.§"

* * * * *

"The chances in favour of and against invasion in force stand thus (18th June):—

1. The body of the cholera invading from the east may have passed on as a body to a geographical limit which renders its entrance into Northern India an impossibility, being out of the line of the essential vehicle.

2. The cholera may not have passed beyond the gate of entrance, but the failure of the monsoon may, as in 1837, 1850, and 1860, cause the material of the epidemic to become anchored for the year to the districts in which it has already appeared.

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* See table, page 232, showing the monsoon cholera of 1869.

† See Part II, page 221.

‡ See the anticipations regarding the cholera of 1870 founded upon the significance of the same phenomenon, page 205.

§ But for the secondary movement in the first week of September 1869 the parallel here suggested would have been almost complete. No amount of foresight could *predict* the probability of such an occurrence; here it was noticed merely as an event that might possibly occur, because the same thing had occurred before.

3. If before the beginning of July the districts south of the Jumna, which for the two past years have been an exempted tract, are re-occupied,* the chances are that the North-West will not escape. In making this statement the parallel of 1865 must not be overlooked when the aura only of the great cholera of these districts passed to the north-west as far as to Ferozepore.†

4. If invasion does occur we need not expect it to extend beyond monsoon limits. This cholera should not reach beyond the Jhelum, even with the most favourable meteorology, and Sealkote should also escape as in 1856 and 1861. The Jullundur Doab escaped on the occasion of both invasions, in 1856 and in 1861. Umballa was not reached in 1856 until the 5th September (the day on which the great epidemic of 1852 also broke out), and then five deaths in all occurred among the European troops. The hill stations escaped entirely in both invasions, and not a man died in September 1852, although choleraic symptoms showed themselves in all of the adjoining hill stations among the men.

5. If the great area suffers as a province, cholera will continue to manifest itself up to the third week of September;‡ and there is no difficulty in predicting that if invasion becomes evident, every station of the area will be liable to attack between the date of invasion and the date of the decay of the vitality of the invading cholera.

"We scarcely require to be reminded of what the results are likely to be in 1869-70 in the event of the body of the epidemic being thrown into the present unoccupied area. The events of 1845 and 1846, of 1856-57-58, and of 1860-61-62, teach with precision what the sequence of events will be, and afford an estimate of the probable loss, which we ought not to regard lightly in looking to the chances of the next three months and in discussing the measures best adapted to meet the events of the epidemic"

* * * * *

Here followed the description of the areas generally exempted in primary invasion as given at pages 52 to 54; and attention was called in particular to the area west of 80° E. Long., lying between the eastern and western divisions of the epidemic area of the Presidency, as a tract of comparative exemption. The concluding paragraph of this memorandum was as follows:—

"If certain portions of the area threatened with invasion enjoy comparative immunity others are marked with the blackest shades on the cholera map, where persistence in power is indicated up to the very latest date to which it is possible for monsoon cholera to survive. Meean Meer and Morar are stations of this class in such an invasion as that now in progress. Although there were no European troops at Morar in 1856, the description given of the character of the cholera by Dr. Kirk leaves in my mind no doubt that had this station then been occupied, the deaths would on this occasion have been reckoned by the hundred. But we must not overlook that over and above all general causes tending to increase the power of a local outbreak, there are causes inherent in the material which raise the ratio of attack in the case of the European regiment, which science has not yet taught us to remove, and, therefore, it is that the object of all measures should be as far as possible to remove the chance of infection."

On 28th June, the Quarter Master General of the Army by order of His Excellency the Commander-in-Chief addressed the Sanitary Commissioner as to the movements to be recommended suitable for the cantonments likely to be affected.

Report on the progress of cholera up to the middle of August called for after the monsoon outbreaks of the year had begun to appear.

By this time the lull in the manifestation of cholera had taken place which marked the interval between the cholera of the spring and the cholera of the monsoon. But in the third week of July, the sudden reappearance of the cholera over a great area showed that the significance of the spring cholera had not been misapprehended. On the 13th August, the Government of India ordered the Sanitary Commissioner at once to proceed to visit the different stations affected, and at the same time a report on the progress of the cholera up to the latest date was called for. This I submitted to Government on 18th August. To save repetition, the facts regarding the epidemic spread of this cholera which have already been mentioned are here omitted; these formed the introduction to this special report.

I may, however, place here an extract from a report by the Sanitary Commissioner for the Central Provinces, which was included in this introduction, because it seems to me to indicate well the aspect of a cholera appearing over an invaded area by revitalisation in the year following invasion. Writing on 12th June the Sanitary Commissioner for the Central Provinces notices the epidemic outburst of the spring months thus: "The disease has not spread from any one definite centre. In every district in which it is now epidemic, reports have been first received of outbreaks in small villages often at a distance from the large centres of population and the main lines of communication; and in some instances similar outbreaks have occurred almost simultaneously in different parts of the same district."

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* This had already occurred, although we were not at the time aware of the fact.

† On the day after this was written (19th June), the report of the prevalence of cholera in the hills beyond the Sutledge led me to make special inquiry into its origin The result of my inquiry was, that I determined this as well as the cholera of Umritsur and Sealkote of the same period to be the manifestation of an offshoot from the cholera of Central India, which was scarcely felt in the intervening area. See Part II.

‡ See page 215 and table on page 232.

My report was continued as follows:—

"In the stations of the east, this cholera showed itself as early as March. The cholera of H. M.s' 58th Regiment, stationed at Allahabad, commenced on 21st March. This is a very usual date for this locality. It was on the 22nd March 1867 that the outbreak commenced in the Jail at Allahabad, which indicated the epidemic movement from the east of the epidemic preceding that now in progress. As early as the 6th March a violent outbreak at the village of Akhoree in the Mirzapore District was reported. On 1st April the first death was reported from Jubbulpore; and on 22nd the Brigadier General Commanding at Gwalior announced three fatal cases between the 3rd and the date of his letter. Cholera was reported in the Nagode Cantonment on 15th April. On 29th April cholera appeared in the Seetapore Cantonment, having been epidemic among the native population from the 25th. In April the Mhow Cantonment also became affected.

"In May the only cantonment attacked was Saugor. On 14th two fatal cases of cholera were announced in the 7th Fusiliers, and on the evening of the 16th 13 fresh cases occurred, of which 7 had died at the date of the report (17th).

"The distribution of the cholera of the European army up to 31st May will be seen from the following statement*:—

January	...	Admitted	None.	Died	None.
February	...	"	"	"	"
March	...	"	26	"	14
Allahabad	...	"	25	"	14
Shahjehanpore	. .	"	1	"	...
April	...	"	44	"	35
Berhampore	...	"	1	"	1
Allahabad	. .	"	14	"	11
Chunar	...	"	1	"	..
Seetapore	...	"	2	"	1
Jubbulpore	. .	"	3	"	3
Shahjehanpore	. .	"	1	"	...
Morar	...	"	22	"	19

May	...	Admitted	62	Died	36
Dum-Dum	. .	"	1	"	
Allahabad	...	"	15	"	8
Seetapore	...	"	6	"	4
Saugor		"	29	"	17
Jubbulpore	..	"	2	"	2
Morar	..	"	5	"	3
Gwalior Fort	...	"	3	"	1
Jullundur	. .	"	1	"	1
Admitted to 31st May			132	Died	85

"The fatal case reported from Jullundur on 12th May has been regarded as doubtful. I look upon it as a true forerunner of invasion; the more so, because in 1860 similar cases were seen in the same month in stations of the Punjab, giving warning of the movement of cholera which was taking place in the Central Provinces.

"It is evident that about this date cholera was in motion over a wide area. It was on the evening of the 16th May that the 7th Fusiliers, stationed at Saugor, were so heavily stricken with cholera. Almost at the same time cholera re-appeared at Morar. The Brigadier General Commanding writes:—"In concluding my report up to 30th April, I expressed a hope that the epidemic had subsided and that we might look forward to the disappearance of cholera. This hope was almost borne out during the first 17 days of May, as only 5 cases occurred. But on the 18th and 19th there were 3 cases in the fort, and on the 17th a case had appeared in the Heavy Battery. The Officer Commanding at Seepree also reported that there were numerous cases of malignant cholera, and many deaths among the natives in the Bazaars and adjacent villages.

"In the last week of May cholera was again in motion, invading the country south of the Jumna, which was, in 1868, an exempted tract. From Banda 293 deaths were returned in May, and 115 between the 1st and 12th June; Lullutpore was entered in the week ending 29th May and 47 deaths were registered up to the 5th June. Among the native troops at Agra this cholera of the beginning of June showed itself, and it appears to have been universal along the tract which I have designated the northern epidemic highway. The Deputy Inspector of the Agra Circle writes to me, dating 14th June, as follows:—"There has been a great deal of cholera in the city and of a very fatal type. * * * I have cholera in almost all this circle. Yesterday I received a report announcing its advent at Jhansi, and its violence at Beaur and Deolee is very great." When a moving cholera has reached so far to the west on this track its limit is not generally found in Hindostan. Its appearance here is followed by the outburst of cholera in Scinde and Persia, at an interval of a very few weeks; this happened in 1860 and in 1867, and in July of this year the outbreak of cholera is again announced.

Interval between the spring and monsoon cholera.

"The distinction between the cholera of the spring and of the monsoon was perfectly marked in the European army taken as a type. Not a single case, in a man, woman, or child, was announced in the week ending 15th July; and the Inspector General, Her Majesty's British Forces, intimates that his weekly reports will be discontinued. In the return for the week ending the 8th July the case of one woman only was entered, who had been attacked in that week (in the Battery at Agra). The return up to 25th June showed that, including men, women, and children, 209 persons had been attacked, and that 124 deaths had occurred. In the six weeks between the 1st June and the middle of July 40 cases and 26 deaths occurred.

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* This statement had reference to men only, and was drawn up from casual returns. The totals are deficient by 5 admissions and 9 deaths.

"The last case of spring cholera appeared among the European troops in the stations mentioned at the following dates:—

Allahabad	June	21st	(58th).
Jubbulpore	„	24th	(2-12th).
Saugor	„	5th	(1-7th).
Cawnpore	„	18th	(19th Hussars).
Seetapore	May	29th	(2-60th).
Morar	June	16th	(103rd).
Lucknow	„	18th	(62nd).

Monsoon cholera of 1869.

"Experience teaches us that a bad cholera of the spring is followed as the rule by a worse cholera during the prevalence of the monsoon, commencing about a fortnight after the rains have set in and terminating throughout the monsoon area about the 20th September.

"In the table which follows the stations affected and the dates of the commencement of the monsoon cholera are shown:—

Monsoon Cholera of 1869.

(European Army).

Station.	Date of commencement.		Deaths.
Jubbulpore	July	18th	4
Saugor	„	28th	15
Morar and Gwalior	August	2nd	24
Jhansi	„	8th	3
Seepree	July	31st	2
Allahabad	„	22nd	30
Cawnpore	„	19th	15
Lucknow	„	28th	72
Fyzabad	August	6th	10
Subathoo	„	5th	4
	Total		179"*

* * * * * * * *

In the pages which followed, a summary was given showing the daily progress of cholera at each affected station from the date of the re-appearance of the cholera, derived from the reports of Officers Commanding and from the intimations received at head quarters by telegraph. These are here left out as having no special bearing on the general history of the epidemic.

Roughly estimated, the European army lost up to 16th August 300 individuals, including men, women, and children.

The report of 18th August ended thus:—

Anticipations regarding the cholera of the year from the middle of August onwards.

"I may, in conclusion, show what has been up to the present the geographical distribution of this cholera, and try to state what are the anticipations in regard to its career during the remainder of the cholera season of 1869 which the study of parallel epidemic history suggests.

"In the first place, it is obvious that the epidemic line which I have found constantly to separate eastern from western influences has not been overstepped. Every station east of 80° E. Long. has suffered, while as yet Meerut and Rohilcund has remained an exempted area.

"But as soon as we pass to the south of the Jumna, the cholera sweeping the great northern highway has no western limit. From Chota Nagpore to the western limits of Rajpootana the invasion of 1869 has been universal; no station has been exempted. As in all previous epidemics, the stations of this tract have proved index stations. From the cholera history of these stations we can tell the exact date at which the cholera of each succeeding epidemic has traversed the continent from east to west. In the study of all epidemics this is a tract which furnishes a consistent history; and when the cholera of this tract and of the southern epidemic highway (which I have described as the epidemic route through the Central Provinces, entered through the Jubbulpore, Seonee, and Mundla Districts) is studied at the same time in relation to the occupation or exemption of either tract, we shall not fail accurately to interpret the geographical phenomena of any epidemic. In tracing backwards into India the cholera invading beyond Hindostan, it is the history of the epidemic upon these highways that is to be enquired into.

"I have said that the line separating eastern from western influences in the Doab has not yet been overstepped. The east has been as usual a natural province in relation to the meteorology of the early months of the year.

"The Superintending Surgeon Major, in his report on the cholera of Allahabad up to 21st June, indicates the absence of the steady westerly hot winds. The phenomena which he describes are those characteristic of an epidemic season in the east. The heat to which he alludes to is not the dry healthy heat of the seasonable hot winds, but the moist and relaxing heat which always accompanies the prevalence of the east wind. He writes :—"Throughout the epidemic the heat was extreme, and, I believe, unprecedented. The atmosphere was thick, lowering, and oppressive. The wind was very variable, chopping from west to east ; *tatties were seldom of any service.*" This last observation indicates to us at once the character of the season ; for it is only during the persistence of the moisture-bearing east wind that *tatties* are rendered useless.

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* The deaths cannot be accurately estimated from Telegraphic Reports.

"The invasion of Meerut, Rohilcund, and the Punjab is secondary to invasion in the east and south. As far as I can judge from a study of all previous epidemics, the line of 80° in the Doab is never passed by cholera from the east, and the history of every invasion of Northern India points to invasion from the south-east and south from the districts lying south of the Jumna. Invasion is always imminent when cholera is in motion on the northern highway. The invasion may occur in epidemic strength or it may occur in shadow only.

"The cholera of 1850 (a cholera exactly parallel with that of 1869) left no mark on our European army of Meerut or the Punjab ; the cholera of 1860 (also a parallel cholera) threw forward its indices in May, but was utterly repelled from the eastern and southern boundaries of this tract. The year 1860 was in Northern India one of the most healthy years ever known as far as the Europeon army was concerned ; but as an offset to this, we must not forget that the cholera repelled in 1860 invaded the area when the opportunity offered in 1861.

"Were the cholera of 1869 now to be stopped in its geographical distribution, the epidemic of the year would present throughout the Bengal Presidency the precise distribution of the cholera of 1860. Powerful epidemic advance from the east has occurred up to 80,° and the northern and southern epidemic highways have been universally occupied. The meteorology of 1850 within the exempted tract very much resembled that of the monsoon season of 1860 within the same limits ; and Meerut, Rohilcund, and the Punjab have remained as yet an exempted area. It is an unpleasant reflection that the exempted cholera-area of 1860 became, *on account of its exemption,* the famine-area of 1861. The geography of the exempted cholera tract of 1860. and of the famine part of 1861, will be found to be absolutely identical. Even now within the uninvaded cholera tract of 1869, the rains have been extremely deficient, and for a fortnight they have ceased altogether.*

"It will be said that cholera exists within this area as the cholera of the Simla Hills and of Umritsur. I have said that when cholera is in motion on the northern highway, there is always the danger that an offshoot may be thrown towards the north-west. This is very different from what we understand by the epidemic movement which results in the universal occupation of a natural province.

"I have elsewhere alluded to such an offshoot as having precipitated a sheet of cholera over the Simla Hills, and the whole tract between the hills and the districts south of the Jumna in the last ten days of May 1865.

"The cholera of the Simla Hills and of Umritsur was, I believe, distributed during the movement which I have noticed as occurring in the first days of June. Deolee in Rajpootana was struck by this cholera on 2nd June, and I allude to this cholera again to recall the fact that the affection of the population was evidently caused by a cholera *in motion,* as I judge from the aspect of the outbreak which resulted, which was exactly what we know to follow poisoning by cholera on an ascertained day.

"We find the 40th Native Infantry at Agra affected on the same day, and on the 4th June, an officer of the 38th Regiment at Sealkote was struck down. I believe that at this time the cholera of the Umritsur District was distributed ; and if this is the case, I reckon that the results of this movement will now be confined entirely to localities affected in the advance. In the epidemic history of Hindostan, we know of no such phenomenon as that of the radiation of cholera as an epidemic from an affected centre, and, therefore, we have no fear for neighbouring stations becoming affected from Umritsur as a focus. What we dread is the evidence of a new movement, knowing that when movement occurs, every station of the natural area will become liable to attack within a few days.†

"Subathoo was attacked on 5th August. If we are to regard this outbreak as an evidence of a new movement of cholera, we cannot but reckon the absence of the vehicle of moisture in the plains in this week but as a most fortunate occurrence. The 6th and 7th August will never be forgotten in epidemic history as the days on which the great outbreaks at Meean Meer began in 1856 and 1861. Had the same vehicle of moisture been afforded, the probability is, that Meean Meer would have been struck a third time on the very same day. The Civil Surgeon of Lahore, dating August 15th, informs me that there is no rain and no cholera at Lahore, and that great hopes are entertained that the critical day is past.‡

"There is, however, no certainty of the exemption of any area from invasion so long as the vitality of the cholera of any reproduction lasts. The vitality of the cholera now epidemic will continue up to about the 20th September,§ and movement may occur at any time before this date. I have already called attention to the enormous extent of the area affected by the invading aura of the cholera of 1868, showing its effects on and about the 21st August. It was on the 4th and 5th September that Umballa became affected in 1852 and 1856, and although the cholera of 1852 was dead in the first week of October, 147 Europeans were attacked, of whom 73 died. In three other epidemics I have noticed the renewal of epidemic strength in this same first week of September—in 1860, 1861, and 1862.*

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* See in Part II, page 221, the anticipations of the Lieutenant-Governor, North-Western Provinces, at this date.

† This anticipation was exactly fulfilled. There was no radiation from this affected area.

‡ See p. 217.

§ See Table p. 232.

"Over the area at present occupied the cessation of the cholera now epidemic is not to be looked for before the middle of September, and whether the area now exempted is to remain unoccupied, or is to be invaded, will be determined within the next three weeks."

Anticipations formed from the history of the cholera of the year up to the first week of September.

Three weeks later, another report on the progress of cholera from the middle of August up to the first week of September was called for. The detail of the events of these weeks need not be reproduced here. But the concluding paragraph and the postscript have a special interest in the cholera history of the year. In concluding this letter for the third time, I mentioned the chance of epidemic movement in the first week of September:—

"It would be premature to conclude that cholera has disappeared for the season in the stations in which it has ceased for the present to show itself. The possibility of re-appearance is important in relation to the maintenance of the cholera camps now established. As far as reported, the general health of the camps seems at present to be good; and as the result of all experience shows that the permanent disappearance of cholera cannot in any epidemic year be counted upon before the 25th September, the necessity for maintaining these camps until late in the current month seems to be clearly indicated. Illustrations showing the maintenance of cholera beyond the middle of September, re-attack commencing after the beginning of September, and even the primary invasion of epidemic cholera in the first week of September, might be quoted for very many of the stations which have lately been affected; it is, therefore, improbable that in all of these stations the cholera of 1869 has come to an end."

Without the slightest warning, cholera appeared in the Peshawur valley in the first week of September; and after the letter from which the above quotation is taken was closed and ready for despatch, a telegram was received in which the General Commanding announced that a few cases of cholera of a mild type had appeared in the city of Peshawur. The letter was opened and the following postscript added:—

"A telegram, dated 7th September, reports the appearance of cholera in the city of Peshawur. This is the first time that the Peshawur valley has been entered in the primary invasion of an epidemic. The course of the present invasion cannot be traced without a knowledge of the epidemic history of past few weeks. In 1861 cholera was violently epidemic in Cabul in October, but in that year the epidemic passed the frontier much to the south of Peshawur, and its passing was indicated by the attack of the outposts lying below the hills beyond Dera Ismail Khan. The Bhawulpore State lying to the east was at the same time suffering heavily.

"There is great danger to be apprehended from a cholera invading the Peshawur valley at this season. Cholera does not die here as it dies over the monsoon province. The cholera of 1858 died in the first week of November, having invaded the Peshawur and Kohat valleys on 26th October; and the cholera of 1862 maintained its vitality up to the same day in November, although invasion occurred in July of that year. The 93rd Highlanders suffered from four distinctly repeated attacks between July and the first week of November in 1862. The cholera of the invasion of 1856 did not reach the Peshawur valley, but it prevailed in October at Mooltan, and at the same time in the Rawul Pindee District, where the 1st Sikh Regiment was attacked. Even although the districts lying to the east of Indus may have become to some extent affected, European troops will in this Doab run a much greater chance of escape than in the Peshawur valley, and it should not be forgotten that, in 1867, the 42nd Highlanders, from the day after the occupation of Cherat, were placed above the choleraic influence which continued to prevail in the Peshawur valley for a month afterwards."

Anticipations regarding the persistence of cholera in the Peshawur valley, and the movements required to escape the localised choleraic influence.

The telegram from the General Commanding at Peshawur, dated 7th September, was as follows:—"Epidemic cholera of a mild type has appeared in the city of Peshawur. Two cases—natives—one fatal, have occurred in the suddur bazaar. None among the troops. Communication between the city and the station is being stopped as much as possible."

On 9th September, the Lieutenant-Governor of the Punjab telegraphed urgently as follows:—

"Three cases of cholera have occurred in Peshawur Cantonment—a sowar of 18th Bengal Cavalry and two other natives. In the city, cases have been occurring for four or five days. Lieutenant-Governor has authorized General Browne, at his request, to make arrangements at once for occupying Cherat as on last outbreak. His Honor trusts this will be approved."

The Government of India telegraphed in reply that if the Lieutenant-Governor thought it necessary, a portion of the garrison might move to Cherat.

But great difficulty followed in getting together carriage, for fever was prevailing generally among the native population, and a fortnight afterwards only one wing of the

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* This anticipation is here a second time repeated. How far it was realised will appear in the sequel.

104th had marched out of the valley. The results in this case will be noticed in the next part of this report. On the 11th it was evident that the cantonment had become affected, and on the 18th every corps in the Peshawur valley was simultaneously stricken. The movements that followed upon these attacks were confined to the valley of Peshawur. The following quotations from a letter to the Quarter Master General of the Army, written on 22nd September, after the occurrence of this outbreak, and while troops were being moved from one place to another within the Peshawur valley, shows that I anticipated good effects only from removing the men to an elevation within the valley or into the Doab lying to the east.* I wrote :—

"The remarks which I made in my note forwarding on Dr. Cuningham's letter of instructions to me had a specific object, which was to point out the danger to the troops so long as they were moved about in the Peshawur valley. The evacuation of the Peshawur Cantonments has in no epidemic been attended with satisfactory results, and you will find the remarks of His Excellency the Commander-in-Chief to this effect in your office letter No. 3C of 2nd January 1868, paragraph 4, in which comment is made on the results of the movements of 1867. The experience of 1862 showed the same thing in the strongest light. From the day in June in which cholera entered the valley until the first week of November cholera continued steadily to show its presence. Four distinct attacks were recognized in the 93rd; and in the last, which commenced in the middle of October, it was while the regiment was in camp that it was stricken as a body. Dr. Munro believes that *every man* in camp was affected on a certain night, and the phenomena admit of no other interpretation.

"The fact that the epidemic of 1858 which preceded that of 1862 died out in the same week in November teaches that there is the probability of persistence or recurrence between the present time and that date, should the primary effects of the invasion now cease, or should the attacks decline in frequency. This I mentioned in my progress statement, dated 8th instant, before a single case had shown itself in cantonments. Had it not been for the fact that the Lieutenant-Governor of the Punjab seemed alive to the dangers of the Peshawur valley, I should have written more strongly than I did then. You will find that it was my belief that great danger was to be apprehended from the entrance at this season of the monsoon cholera into such a situation; and it is my opinion that the movement into camp in the neighbourhood of cantonments is not sufficient, although a step in the right direction."

Anticipation regarding the capabilities of the stations of the extreme north of India for localising an epidemic cholera.

While speaking of the comparative capabilities of the stations of this part of India to localise an epidemic cholera (note p. 226), I noted the remarkable fact that in each of the three occasions on which cholera had appeared, Nowshera, the first cantonment to the east of Peshawur, had, out of the regiment cantoned there, but two fatal cases of cholera among the men. And on this, the fourth occasion, the very same thing occurred, for two men only of the 88th died in 1869. The shadow of this great cholera passed the south of the Rawul Pindee District. The registration of the general population gave 11 deaths in all in September and October, and not a case of cholera was shown among our troops in any portion of the Doab between the Jhelum and the Indus.

The appearance of cholera in the Peshawur valley being without a parallel in recent epidemic history, its occurrence was not anticipated.

The anticipations of the 18th June do not include Peshawur within the area likely to be affected in 1869. I was of opinion that as in 1856 and 1861, the districts lying to the east and beyond the immediate influence of the monsoon would, on this occasion, provide a belt of width sufficient to prevent the passage of cholera from the south-east to the frontier, and although this belt escaped almost entirely, wide as it was it proved powerless to prevent the sweep of the air-borne cholera into the regions of the frontier and far beyond. This is the parallel of such a case as I have described in May 1865—the manifestation far to the front at the point attained by the head of the epidemic, while in districts passed over scarcely a trace is apparent. The exemption of the belt enclosing the frontier was thus shown :—

Cholera deaths of 1869 *in the exempted belt beyond direct monsoon influences which usually protects the North-Western Frontier from the attack of Cholera during primary invasion.*

DEATHS OF THE GENERAL POPULATION, 1869.

		Ferozepore...	20
Jhelum	7	Mooltan	2
Jhung	1	Montgomery	16
Shahpore	1	Mozufferghur	None
Rawul Pindee	13	Dera Ghazee Khan	2
Huzara	12	Dera Ismael Khan	2

This registration was spread over the whole year, and in the month of the invasion of the frontier, 5 only of these 76 deaths were reported.

Explanation of the phenomenon and the anticipations formed as soon as the fact of the appearance of cholera on the frontier was reported.

But to one accustomed to such phenomena, such a fact as the above is not so startling as to those who are less able to comprehend it in its full significance. Knowing nothing of what was actually in progress, with simply the first telegraphic information regarding the Peshawur valley at my disposal, in forwarding on to the Sanitary Commissioner the intelligence, I wrote that it would probably be affirmed, seeing that cholera had existed since May in the Umritsur and adjoining districts, that by some means the cholera had been conveyed from these districts into the Peshawur valley. But I asserted my belief that the parallel of 1856 and 1861 would not be found broken; that no cholera would be found between the Jhelum and Indus, and that we were to look far to the south for movement over a great area, such as had occurred in September 1860 (page 24) and October 1861 (page 25). I looked, in short, at this frontier cholera as the result of the movement of the first week of September predicted in my various letters; and as soon as the Sanitary Commissioner returned, at my request he wrote (October 22nd) to the Sanitary Commissioner for Bombay, asking whether in this week the movement of cholera had been observed in Scinde.

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* The Sanitary Commissioner was still engaged in visiting the cholera-stricken cantonments of the North-Western Provinces.

The general results of this movement of September and October are contained in the following letter addressed to the Secretary to Government in the Home Department during the absence of the Sanitary Commissioner in England, dated 3rd February 1870:—

Movement of cholera in the first week of September and later in the year in countries beyond the limits of Hindostan.

"Referring to letter from the Sanitary Commissioner with the Government of India to your Department, No. 394, dated 31st May 1869, in reply to your No. 174 of 27th idem, with enclosures from the Secretary of State for India, forwarding, for the consideration of His Excellency the Governor General in Council, the suggestion that the British Delegate to the Board of Health at Constantinople should be supplied periodically with correct information regarding the state of the public health in India in anticipation of the possibility of the introduction of epidemic disease into the Ottoman ports of the Red Sea and thence into Europe,[*] I have the honor now to invite your attention to the contents of a despatch from the Political Agent and Her Majesty's Consul at Zanzibar, dated 25th November last, and transmitted to this Office with Foreign Department docket of 27th January."

This despatch announces the appearance of epidemic cholera towards the end of October on the eastern coast of Africa and an outbreak at Zanzibar which commenced on 20th November.[†]

2. I believe it to be a matter of great importance that the epidemic relations of this cholera should be clearly comprehended, in order that the sequence of the events that may follow in the current year and in 1871 may not be misunderstood.

In the last paragraph of the first section of my lately published report (page 157) written in June last, you will find the appearance of this cholera on the eastern coast of Africa at this time anticipated in relation to the history of the epidemic cholera of India of 1868 and the spring of 1869 and its significance defined. At this time no advance of the epidemic cholera of 1868-69 beyond the limits of Hindostan had occurred, although the movement was regarded as imminent.

3. Following the epidemic movements of cholera in the Bengal Presidency of June and July, it was reported to the Government of India that cholera invading Persia had committed great ravages at Shiraz and Ispahan, and while still existing in Northern Persia had entirely ceased elsewhere about the middle of August. The cholera of this advance appears to have been felt also in Southern Russia, for in July a few cases occurred at Kieff. The disappearance of this cholera in August is, I believe, the homologue of the disappearance which towards the end of August occurred over an enormous tract in our Presidency in the Gangetic and Central Provinces.

In my progress statement bringing up the epidemic history of 1869 to a late date in August, I remarked on the probability of a further epidemic movement of cholera over Northern India in the first week of September, my anticipation being founded on a parallel event in the epidemics of 1856 and 1861, which will be found noticed in my printed report. The movement did occur, and its extent to any one unaccustomed to regard cholera as air-conveyed will appear almost incredible.

It might be argued that in Persia and Russia the cholera of the first week of September was a revitalisation under a special meteorology of the invading cholera of July. But to us in Northern India the epidemic history of the previous months proved that this cholera of the first week of September was a cholera truly invading an unoccupied area, and therefore I am disposed to believe that the invading cholera, which in the Meerut District and in Southern Russia dates from the same week, was the cholera of one and the same movement. Be this as it may, both manifestations were beyond question due to the cholera of the same epidemic. In the same week the Sirsa District was occupied, and the southern border of the Bhawulpore State touched; Upper Scinde was covered, and the Peshawur valley filled with cholera; Astrabad, on the Caspian, was struck on the 8th September, and in the same week the cholera broke out in Kieff.

In a postscript to a progress statement dated 8th September, written on receipt of the first telegram reporting cholera in Peshawur City, it will be found that I stated my belief that this appearance of cholera would be found coincident with epidemic advance on Northern Scinde and not upon the Punjab generally, and the sequel showed that my conjecture was correct.

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[*] Proceedings of the Sanitary Commissioner with the Government of India, No. 138 of 1869.

[†] It is most interesting to note that it was on this very day fifty-one years ago, 20th November 1818, after the setting in of the north-east monsoon, that cholera first appeared at the Mauritius. Even after the lapse of all these years, the evidence of importation, which appeared to Sir Gilbert Blane to be conclusive, requires to be reviewed in the light thrown upon it by the parallel invasion of Zanzibar in 1869.

4. This cholera of Northern India, of Northern Persia, and of the Caspian Provinces, will be found described in my report as the northern invading limb of an Indian cholera. It progresses along the track which I have called the northern epidemic highway, and has its termination in Russia and Northern Europe.

5. It is the southern invading limb of the same Indian epidemic which has reached the eastern coast of Africa, and which is the subject of Dr. Kirk's despatch.

As early as June some cases of cholera were reported in the eastern districts of Lower Scinde; but it was in the end of August and in the same first week of September that the invasion of the province actually occurred. This cholera wave appears to have extended to the Southern Provinces of Persia, and of this the effects are detailed in a report forwarded by the Government of Bombay, dated 11th November.

As on our North-Western Frontier, so in Lower Scinde this invading cholera was still in epidemic vigour up to the first week of November. At the end of October many people were dying daily at Kurrachee. From my notes I find that I again anticipated the appearance of cholera on the African coast, towards which the north-east monsoon was now steadily blowing. In the last week of October Her Majesty's transport *Euphrates*, when 550 miles west of Bombay, passed through an immense cloud of locusts blown from the Indian shores, the wind being N. N. E. The steamer *Krishna*, which left Aden on 30th October, "experienced fine weather to Longitude 53° E., but then there was a very strong north-east monsoon and heavy head sea to about 68° E."

It is just at this time that Dr. Kirk's narrative reports the appearance of cholera on the mainland north of Zanzibar, indicating the progress to the west of the southern limb of our Indian cholera of 1868-69.

6. Invasion beyond Hindostan has in various epidemics progressed on both the northern and southern highways; but in other epidemics one highway only has been occupied and the epidemic journey has been continued along one only of the routes. The termination of the journey begun on our northern highway is Russia and Northern Europe; when our Indian cholera moves on the southern, Arabia, Eastern and Northern Africa, and the shores of the Mediterranean generally, are threatened.

7. In the light in which I read parallel history, the epidemic now in progress has still before it a vital existence of at least two years, since it was in April 1868 that its movement from out of the endemic area occurred.

* * * *

The fact that the cholera of the current epidemic has already reached Russia and Eastern Africa may, perhaps, be considered of good import as regards the prospects of Central India and our Northern Provinces in 1870, showing, as it does, that a certain amount of the materies of the epidemic is certainly lost to us; for in relation to this diminution the material of the fresh invading waves, which we have still to fear in Northern India, may have been to a great extent pushed on beyond the frontier.*

8. It is important that we should consider what is the parallel in the history of the last invading cholera of Europe of this Zanzibar cholera of November 1869.

At page 356 of the Indian edition of the proceedings of the Constantinople Conference will be found mention of the invading cholera of the end of 1864, upon which I grounded my anticipation of a parallel cholera on the African coast in the end of 1869. Indications of the presence of cholera in Southern Arabia should now be carefully enquired after; and even the most trifling number of cases may be true forerunners of epidemic invasion. I should be inclined to accept the mere empirical fact of the parallel occurrence of 1864 as indicating the probability of the appearance of a great cholera in the districts now occupied, and in Arabia in May, and in Egypt in the same month, or more probably at the usual season of invasion in July from the evidence which the event affords of epidemic progress on the southern highway.†

9. Under any circumstances it is right that the warning should be given. We may never again hear of this Indian cholera when driven so far to the south. But whether Arabia and Europe is invaded or not, there can be no question as to the significance of this cholera of Zanzibar in epidemic history. Two years of vitality remain to the cholera of the current epidemic; and in the event of the spread to Europe of this cholera and that now present in Southern Russia persistence throughout 1870 and 1871 may be expected."

Many difficulties lie in the way in trying to estimate the position of an epidemic cholera and the occurrences likely to follow; some of these are insuperable.

These papers contain the anticipations formed regarding the cholera of 1869. Those only who have carefully studied cholera by the history of previous epidemics can realise how vast is the field which in a single year is opened up for our study. The events as they occur month by month and over the different natural provinces of the invaded area call for an intimate knowledge of past epidemics that their significance may be read aright. No superficial knowledge will suffice in attempting to predict what is yet to be revealed in the after months of any year of invading cholera. It cannot but be discouraging to the earnest student of Indian cholera that those who know nothing of what cholera is in India should be ready to maintain that these events happen not by laws but by coincidences, and that the facts, as they occur, are distorted in order to be made subservient to a theory. Those who know most intimately what cholera in India means will be the least anxious to give to others anticipations in advance of coming events, from being aware of the difficulty in many cases of making even a guess as to what is about to happen. But when I have been required to put my opinion on record, I have not hesitated to do so, judging that any blame that might attach to me for a false interpretation of passing events is not to be reckoned in the scale against the benefits that may possibly arise from a warning given in time. I consider that these anticipations hold a position apart from that in which others would place them. At the beginning of the cholera season of 1869, I deduced that from the geographical situation of cholera, a certain sequence of events would happen at certain dates; and since the sequence of the events did occur as anticipated, I recognise that what was then recorded is entitled to a place not in the province of theory but in that of legitimate deduction. It must not be expected that when two alternatives are suggested both shall come true. It is the one or the other that may be realised; or the phenomena may so be mixed that a parallel half way between either may clearly be shaped out. When on the 18th June I wrote the parallels of 1850 and 1860 and again those of 1856 and 1861, I did not anticipate that both parallels would be realised in 1869; but to any one knowing the entire history of the four epidemics, the consistencies of what was suggested are now abundantly apparent. Notably these anticipations failed in the one point of having excluded the Peshawur Frontier from the area likely to be affected in 1869. Unless I had taken the parallel of 1844, I know of no other in recent times that would have suggested the advance beyond the frontier in the case of invasion in the first year, and of the epidemic relations of this cholera of 1844 I have no exact knowledge; and yet, perhaps, the fact of the invasion of Scinde in 1860, above alluded to, might have taught us that the frontier was not safe from the attack of air-borne cholera. The events of these two months upon the frontier will always hold an important place in the epidemic history of Hindostan; and when it is admitted that the invasion was not anticipated, it should not be forgotten that what did happen subsequent to the invasion proved the correctness of the opinions expressed at the time of the occurrence.

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* Above was placed my idea as to the sequence of events likely to happen should it have proved that with the advance of the head of the cholera of 1869 beyond Hindostan, the general body of the materies of the epidemic had not disappeared. Neither in the spring of 1870 nor up to date has epidemic cholera shown itself in Upper India.

† See page 223, where the latest despatch from the Resident at Aden is quoted, in which is mentioned the rumour of the appearance of this July cholera to the west of the Red Sea.

PART II.

THE HISTORY AND GENERAL ASPECTS OF EPIDEMIC CHOLERA IN 1869.

All the country south of the Jumna, from Allahabad to Scinde, was at some period or other of 1869 covered with one universal sheet of cholera. Not one district in all of this vast tract claims to have been exempted from the invasion of 1869. From Northern Oudh to the Chutteesghur Division of the Central Provinces, the report of the universality of the great cholera of 1869 is the same; there was not one district in the whole tract that was not severely visited.

Areas of exemption in 1869.

But as soon as enquiry is made regarding the population of the districts lying north of the Jumna and west of 80° E. Longitude, we find that the margin of the invading cholera has been reached; that here cholera found no footing in 1869, and that from Shahjehanpore and Futtehghur to Umritsur there existed an enormous tract of country traversed by every means of human communication, which repelled the invading cholera of the year, although it marched up in strength to the very confines of the area. This was the tract of possible exemption indicated to Government on 18th June. The eastern portion was indicated as an area likely to be free from cholera; in the western, the chance that the cholera of 1869 would follow the course of the epidemics of 1850 and 1860, and show itself in the south only or in a sporadic manner only over the area as a whole, was weighed against the possible occurrence of an invasion corresponding to that of 1856 and 1861.

As far west as Cawnpore, the force of the epidemic coming from the east was felt. Cawnpore shows a register of 2,798 deaths among the population. This mortality tails off to the west; thus—Futtehghur, 325; Shahjehanpore, 257; Etah 242. To the north, Bareilly registers 935 deaths and Budaon 1,141, probably in continuation of the cholera of Northern and Western Oudh, in which all districts suffered severely; Gondah, Baraich, Fyzabad, and Seetapore having in 1869 registered upwards of 9,000 cholera deaths.

The Civil Surgeons of these districts report as follows, the same questions having been put to all by the Sanitary Commissioner:—

BAREILLY.—"There has been no outbreak of epidemic cholera in the city or district of Bareilly during 1869." Deaths registered 935.*

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* An exaggerated statement from imperfect registration; in 1868 the same exaggeration was evident.

BUDAON.—"The statistics greatly exaggerate the prevalence of the disease. All sudden deaths, one may say, are put down to cholera. Possibly as many as 200 were really attacked by cholera (up to 1st October)."

SHAHJEHANPORE.—"A very small portion only of the district was affected. There have been no cases of cholera in the city or civil station. No measures of quarantine have been attempted." Registered deaths 257.

MORADABAD.—"Not a single case of cholera has occurred either in this station or in the district during the present year." Registered deaths 195.

ETAH.—"There has been no cholera epidemic in this district during the year. A sporadic case of the disease in a boy was admitted into the dispensary and proved fatal." Registered deaths 242.

BIJNORE.—"There has been no cholera either in this station or district during the current year." Registered deaths 68.

SAHARUNPORE.—"Without doubt the statistics given are not to be relied on at all. In fact I do not believe that one of the cases so registered was cholera. Not a single case has come under my observation; and on the most careful enquiry from the chief Native Hukeems I could hear of no one case." Registered deaths 182.

MOZUFFERNUGGUR.—"This station and district have been free from epidemic cholera during the present year." Registered deaths 166.

Exempted area of the North-Western Provinces continued into the Punjab.

From Umballa, Loodianah, Hoshiarpore, Kurnaul, and Delhi in the east of the Punjab, we have no reports from Civil Surgeons, because their districts remained free from cholera during the year. From Jullundur there is a report, although the Civil Surgeon remarks that but 12 cases in all came under observation during the year. Quarantine was maintained at the Beas from 9th August to 14th September, and during this time it is extraordinary to find that four travellers from Umritsur only were found to have cholera, of whom one died. When we consider that Umritsur had been suffering for two months and a half from cholera before the quarantine was established on the Beas, and that all districts east of Jullundur continued free from cholera throughout 1869, we conclude that Jullundur was also portion of the same area, and we are prepared to learn that the cases which did occur were with one or two solitary exceptions travellers from the west on the Trunk Road. But that the quarantine was the cause of the exemption of the Jullundur District there are no reasonable grounds for maintaining. Dr. Warburton writes:—"I do believe these measures were effective. I think the fact that only 12 cases occurred in the whole district is a sufficient proof, that is, if we look upon cholera as a contagious or infectious disease, which I believe it to be." I think it right to mention this case here, as it may at some future time be brought forward in illustration of the efficiency of quarantine on this occasion.

Intrusion into the exempted tract from the south reaching as far as the Meerut District.

But having traced the exemption of the country in every district from the line of 80° to the Beas bounding the Umritsur District, it is necessary to turn back again towards the east, to call attention to an intrusion from the south into an area adjoining the exempted tract, to which I have not yet alluded,—an offshoot of cholera from the northern epidemic highway, having for its base the cholera of this highway, and for its apex a portion of the Meerut District, in which it died away in the north. It was of no power, as the statements which follow show. But to us, viewing it in its epidemic relations, it has a value above what its mere aspect suggests. This offshoot comprehends the cholera of the Meerut, Bolundshuhur, Allyghur, and Etawah Districts, and it may be studied in connection with the cholera of the Agra and Muttra Districts. The Civil Surgeons report as follows:—

MEERUT.—The Civil Surgeon of the Meerut District thinks that the mortuary registration, which shows 565 cholera deaths, exaggerates the extent of cholera in 1869, but he recognises the prevalence of cholera as in excess of that of ordinary non-epidemic years.

BOLUNDSHUHUR.—"The statistics are not reliable, because they exaggerate the prevalence of the disease." Registered deaths 155.

MYNPOORIE.—"I consider the statistics pretty correct. The deaths are perhaps more from the fact that during cholera seasons every death is noted as cholera." Registered deaths 349.

ALLYGHUR.—"I do not consider the statistics reliable. They err in exaggerating the prevalence of the disease. About 1 in 8,000 of the population may have died." Registered deaths 429.

Etawah, a portion of the exempted area.

Passing to the east, the Etawah District bordering on the exempted area, and which was indicated in June as a district likely to escape invasion, gives 449 deaths in the registration. But the report of the Civil Surgeon, who has evidently taken every care to verify his statements, shows that Etawah was actually a portion of the exempted tract in 1869. And the same fact was affirmed by the Civil authorities in the end of July, when they objected to receive the troops from Allahabad into their district, on the ground that to do so was to introduce an infecting material into an uninfected area. The Civil Surgeon writes:—"To the best of my belief there were only 26 cases of cholera. Of these 12 recovered and 14 died. If there is any error, it is, I believe, in exaggerating this number."

Definition of the exempted tract in the North-Western Provinces and Punjab.

Nothing can be more definite than the geography which the reports and registration of these districts assign to the cholera of 1869. The natural province west of 80°E. Longitude is as definitely marked as I have shown it to be in 1818 and in all succeeding epidemics. The great cholera of the east marched up to its eastern margin, and the great cholera of the northern epidemic highway skirted its southern margin in all its strength, and yet was powerless to pass to the north, even into the Etawah District immediately adjoining. The pyramidal offshoot affecting Allyghur, Bolundshuhur, and Meerut was hemmed in on the east, the north, and the west by districts absolutely exempted. And the cholera of the Punjab extending from the Beas to the hills had no power to turn back and invade even the districts lying immediately to the east.

Significance of the exemption of these tracts and of the offshoot which reached the Meerut District.

Before going further, I may note here what I take to be the significance of the intrusive offshoot from the northern highway and the exemption of Delhi, Umballa, Loodianah, and Jullundur, while the districts south and west and east of Delhi and those west of Loodianah and Jullundur suffered.

At pages 19, 25, 53, and in other portions of the report of last year, I have shown from the facts of several previous epidemics that the body of cholera moving from the south-east towards the north-west is apt to become divided into two, the one column pursuing its course uninterruptedly towards the north-west, while the second is turned into a diverticulum and shoots sharply towards the north, towards Deyrah Dhoon and the Terai; and that between these two limbs lies a triangular space, which is exempted from invasion, having for its base the hills and the Umballa, Loodianah, and Jullundur Districts, and probably the Roorkee District to the east, and as its apex the point at which these two invading limbs diverge. From this exempted space on most occasions the Delhi District is excluded; but in 1869 the division took place further to the south than usual, and in connexion with this fact the weakness of the limb invading into the Meerut District was evidently associated. We find cholera in Goorgaon, Hissar, and Sirsa, to the south and west of Delhi, and abundant manifestation in Muttra and Agra; and indefinitely beyond, to the south and west, the great cholera sheet of the year covered all Central and Western India. The pyramidal offshoot of Allyghur, Bolundshuhur, and Meerut I regard as the homologue of the northern invading limb of the cholera of the western division of the epidemic area of 1856 or 1861; and the pyramid-shaped exempted area of 1869, having for its base the hills and the adjoining districts, and for its apex the Delhi District, I take to be the same which was left for the time, or, permanently, a blank in the geography of former epidemics.

Exempted tract in Northern India, the districts lying immediately beyond the usual limits of monsoon influences.

Before speaking of the history of the invasion of the invaded area of 1869, which comprehends the history of the cholera of the districts of the northern epidemic highway, the cholera diverted into Allyghur and Meerut, the cholera of the districts lying west of Delhi, the cholera of Lahore and Umritsur and the districts immediately to the north, and the cholera of the Peshawur Frontier, I shall complete here what is to be said regarding the exemption of tracts within the general area covered by noticing the exemption, so often spoken of in my previous report, of the region beyond the limit of the monsoon, that is, of the districts in the north of the Punjab between the Jhelum and the Indus and the country lying to the south, comprehending Mooltan and the districts adjacent.

Knowing nothing beyond the bare fact that cholera had appeared in the Peshawur valley, at once I drew from previous epidemic history the inference that no geographical continuity would be found between this cholera of the first week of September and the cholera which had existed from the end of May up to the same date in the Umritsur and adjoining districts, and that if cholera appeared at all in the Rawul Pindee District, it would be but the shadow of what was likely to occur in the valley of Peshawur. It is unnecessary to go back to epidemic history to show that quarantine has nothing to do with the exemption or occupation of the districts between the Jhelum and Indus; here again in 1869 we have repeated simply the illustration of 1856, 1861, and 1862 of exemption in relation to a certain geographical position (see note, page 226 of the report of last year). The Sanitary Commissioner for the Punjab reports that there were 11 deaths from cholera during the epidemic period, of which two were seen by the Civil Surgeon of Rawul Pindee and one by the Garrison Surgeon of Attock; and that the others were alleged to have occurred at a village on the Indus, but that their genuineness was questionable. Immediately to the west the inhabitants died by the thousand in the vallies of Peshawur and Kohat.

I shall reserve what I have to say regarding indices afforded by the aura of the cholera of invasion within the area actually uninvaded until I come to speak of the phenomena attending the various movements of cholera in 1869. The registration of the general population shows very beautifully the fact of exemption, and any statements that might have been here added would have reiterated the same thing. The districts of the Punjab shown as exempted, were truly exempted in 1869.

With reference to the facts stated in the paragraphs which follow, the results of the registration of cholera deaths throughout Central and Upper India in 1869 are shown in the table here annexed:—

Cholera Deaths registered among the General Population of the Bengal Presidency in 1869.

Districts.	Estimated lation.	January.	February.	March.	April.	May.	June.	July.	August.	September	October.	November.	December.	Total dea the year.	Death ra 10,000.
Eastern Districts of the N. W. Provinces.															
Ghazeepore	1,332,403	10	5	11	176	694	1,343	2,422	4,194	818	75	6	14	9,708	73·31
Benares	793,277	8	24	98	233	352	702	720	1,000	262	25	7	6	3,527	44·46
Mirzapore	1,054,413	...	30	258	296	607	977	901	883	543	327	12	26	4,855	46·05
Azimghur	1,385,872	6	12	10	52	280	1,018	2,204	3,196	1,155	691	203	9	8,816	63·61
Jounpore	1,015,427	9	7	70	381	509	606	491	597	104	62	7	11	2,863	28·20
Goruckpore	1,983,816	1	2	39	468	673	1,406	2,451	2,128	947	350	36	2	8,593	43·32
Bustee	1,455,607	7	2	141	786	688	1,339	1,004	223	105	54	...	...	4,349	29·88
Allahabad	1,393,183	16	52	170	283	642	280	260	1,089	47	10	6	...	2,864	20·56
Futtehpore	680,786	...	1	281	8	25	474	163	136	122	66	24	...	1,300	19·10
Cawnpore	1,188,862	2	3	5	21	72	183	175	1,281	548	452	56	...	2,798	23·54
Futtehghur	915,943	3	...	10	8	6	25	37	121	42	63	10	...	325	3·55
Districts of Oude.															
Sultanpore	930,023	142	52	43	17	49	339	326	656	217	237	118	59	2,255	24·25
Fyzabad	1,437,009	69	14	89	485	453	528	196	205	143	119	31	24	2,376	16·53
Gondah	1,167,816	2	5	5	225	703	1,015	707	392	385	95	10	...	3,554	30·43
Seetapore	930,224	21	67	336	825	392	144	66	23	10	78	44	12	2,018	21·69
Baraich	774,437	...	...	4	247	635	232	30	66	58	2	..	...	1,274	16·45
Kheree	737,732	...	4	...	17	5	38	7	...	...	...	..	..	71	·96
Pertabghur	936,053	25	27	192	472	315	156	58	224	81	132	63	17	1,762	18·82
Rae Barelly	782,874	4	1	4	213	468	1,018	1,259	907	288	274	165	88	4,779	61·04
Nawabgunge	875,376	41	...	..	31	118	142	279	210	109	319	14	9	1,272	14·53
Oonao	724,949	...	3	10	13	63	340	523	1,119	341	119	25	47	2,603	35·91
Lucknow	697,499	2	.	3	36	115	115	40	194	106	33	11	3	658	9·43
„ City	273,120	1	...	2	1	10	18	5	123	13	...	...	...	173	6·34
Hurdui	930,977	...	4	1	32	8	64	52	30	24	113	10	1	339	3·64
Districts of the Central Provinces.															
Raepore	586,118	...	.	.	...	1,037	4,471	2,202	1,081	558	...	...	...	9,349	159·51
Belaspore	530,541	..	.	62	199	1,029	2,038	3,586	1,154	224	28	...	...	9,220	173·78
Sumbulpore	268,295	...	..		..	...	6	87	277	278	62	...	...	710	26·47
Jubbulpore	539,106	1	4	.	487	1,590	2,034	410	135	23	...	..	...	4,684	86·88
Seonee	421,650	...	..	151	176	358	1,040	265	58	11	...	..	...	2,059	48·83
Mundla	217,264	1	.	29	30	708	2,089	621	467	173	211	11	3	4,343	199·90
Nursingpore	340,356	...	..		395	1,530	2,074	321	5	...	..	...	...	4,325	127·07
Dumoh	280,554	...	...	..	159	968	1,354	242	309	74	...	..	...	3,196	113·92
Saugor	490,636	12	2	...	62	1,041	4,306	2,852	920	112	.		...	9,376	191·10
Chindwarra	260,913	...	...	...	52	14	26	6	...	5	...	..	...	103	3·95*
Baitool	254,915	...	11	42	4	61	111	78	51	43	4	3	3	411	16·12*
Hoshungabad	427,056	37	10	12	72	666	1,181	328	67	6	...	...	..	2,379	55·71
Nimar	166,882	17	80	211	117	12	29	42	59	50	...		...	617	36·97
Bhundara	608,480	...	...	.	...	...	121	141	521	171	...	...	..	954	15·68
Nagpore	558,119	..	...	16	102	67	134	64	610	235	64	..	...	1,292	*23·15
Balaghat	173,121	...	...	.		25	303	70	40	6	...	..	...	444	25·65
Wurdah	176,228	...	...	..	103	254	223	437	613	105	22	2	.	1,759	99·81
Chanda	414,869	...	..	.		...	1	82	485	153	...		...	721	17·38
Districts of the Berars ...	2,074,614	10	70	139	1,759	1,385	770	3,047	2,618	848	164	18	119	10,947	52·76
Districts of the N. W. Provinces south of, or bordering on, the Jumna.															
Banda	724,372	...	...	..	221	123	410	197	321	36	85	...		1,393	19·23
Humeerpore	520,941	.	..	1	...	32	55	759	957	212	39	4	...	2,059	39·52
Jaloun	405,272	...	..	2	3	36	571	319	1,250	322	75	...	...	2,578	63·61
Etawah	620,444	1	..	2	6	6	3	14	30	60	252	67	8	449	7·17
Jhansi	357,774	...	...	..	1	...	35	163	1,438	152	5	.		1,794	50·14
Lullutpore	248,146	...		..	..	20	1,186	779	179	219	13	6	...	2,702	108·89

* Elevated tracts

Cholera Deaths registered among the General Population,—(continued.)

DISTRICTS	Estimated population.	CHOLERA DEATHS REGISTERED IN EACH MONTH.												Total deaths of the year.	Death rate per 10,000.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
Districts of the N. W. Provinces lying west of the line of 80° E. Long.															
Bareilly	1,404,109	20	14	22	32	19	19	14	204	188	275	123	5	935	6·
Budaon	880,810	3	2	7	15	11	9	10	92	350	562	72	8	1,141	12·
Shahjehanpore .	918,850	...	...	...	24	13	2	2	2	4	174	35	1	257	2·
Moradabad	1,095,806	12	9	17	15	19	21	23	18	20	17	19	10	195	1·
Etah	614,351	8	1	6	9	8	30	37	36	23	64	20	1	242	3·
Mynpoorie	700,220	2	4	5	9	9	7	28	51	87	138	9	2	349	4·
Allyghur	925,538	10	5	2	12	12	53	41	185	76	14	12	7	429	4·
Bolundshuhur	800,481	3	7	4	12	12	14	6	16	50	22	7	2	155	1·
Agra	1,028,544	3	5	3	11	39	330	707	568	104	20	7	14	1,913	18·
Muttra	800,321	3	2	7	8	18	122	284	337	144	110	23	7	1,060	13·
Meerut	1,199,593	7	7	5	17	9	21	12	45	152	240	34	16	565	4·
Mozuffernuggur	682,189	10	14	10	18	10	32	7	15	13	18	8	16	168	2·
Seharunpore	808,483	6	5	83	14	9	18	13	6	1	12	5	10	182	2·
Bijnour	690,075	1	3	2	9	9	7	6	8	4	9	5	5	68	·
Deyrah	102,831	...	...	...	...	...	.	...	1	...	...	...		1	
Terai Pergunnahs	91,802	...	...	...	...	...	...	...	..	...	...	. .	.	...	
Kumaon	385,790	...	...	...	...	...	...	...	..	...	...	...	.	...	.
Ghurwal	248,742	...	...	...	..	...	...	...	.	...	...	...	.	...	
Punjab.															
Goorgaon	690,522	1	2	7	6	15	35	59	141	143	216	11		636	9·
Delhi	602,033	1	1	...	2	10	16	11	1	1	3	...	1	47	·7
Rhotuk	536,905	...	1	...	...	15	20	7	3	...	...	...	.	46	·
Hissar	484,681	...	1	...	2	1	8	45	142	60	38	...	..	301	6·
Sirsa	210,795	...	...	...	...	1	...	...	6	26	38	1	...	72	3·
Kurnaul	610,027	1	2	5	6	2	8	3	3	5	2	1	1	39	·
Umballa	1,008,052	3	2	2	6	10	8	4	3	4	6	...	...	48	·
Simla	20,402	...	...	...	...	...	.	...	1	1	...	...	..	2	·
Jullundur . .	783,020	. .	...	4	...	...	...	1	4	...	...	...	.	9	·
Loodianah	583,445	...	2	2	2	3	1	1	2	1	3	1	1	19	·
Hoshiarpore	938,890	1	1	1	7	6	2	..	3	2	4	...	...	27	·
Kangra	744,162	2	5	5	4	9	13	9	6	9	5	3	8	78	1·
Goordaspore	906,126	1	...	2	6	2	5	1	92	45	. .	...	1	155	1·
Sealkote	994,458	...	1	3	3	3	3	2	6	7	3	...		31	·
Umritsur	832,750	5	6	6	8	21	44	613	2,653	224	23	4	1	3,608	43·
Goojrat	616,347	...	2	3	11	14	9	9	7	...	1	2	3	61	·
Goojranwalla	550,576	2	5	6	2	6	.	11	24	22	6	1	4	89	1·
Lahore	775,551	1	1	2	2	10	8	12	133	121	6	1	.	297	3·
Ferozepore	533,416	...	...	...	...	4	1	7	1	.	7	..	.	20	
Montgomery	350,437	...	...	...	...	...	...	16	...	...	. .	..	...	16	
Mooltan	459,780	...	...	...	...	...	...	...	. .	2	.	...	...	2	..
Mozufferghur	295,547	...	...	...	..	...	...	...	...	...	..	...		...	..
Dera Ghazee Khan	305,903	...	...	...	...	2	..	.	..	...	..	...	...	2	..
Dera Ismael Khan	389,533	...	. .	...	...	1	...	...	1	...	...	...	..	2	.
Jhung	348,027	...	...	...	..	...	. .	...	.	...	...	...	1	1	.
Shahpore	368,796	...	...	...	...	1		...	. .	...	. .	...	...	1	.
Jhelum	500,988	. .	...	...	2	2	1	1	1	...	...	...	..	7	.
Huzara	364,324	...	..	2	1	. ...	...	1	3	1	2	1	1	12	
Rawul Pindee	699,047	...	...	...	...	2	...	...	...	2	9	...	...	13	
Peshawur	498,479	...	..	1	6	4	1	...	2	1,704	1,155	99	13	2,985	5
Kohat	140,279	...	...	...	..	...	..	...	...	1	499	8	...	508	3
Bunnoo	287,547	...	...	...	.	. .		. ..	...	1	7	71	45	124	

General connection of the cholera of 1869 wherever met with, and the links joining on this cholera with that of the endemic basin.

Returning once more to the east, to the western margin of the yellow patch of 1868, we have to trace the occupation of the districts south of the Jumna, the occupation of the northern highway, and the invasion of Scinde and the North-Western Frontier, and so to link on the cholera of Lower Bengal of 1868 with the cholera of Persia and the Caspian Provinces of 1869.

Occupation by invasion of the districts lying south of the Jumna. Movement of the last week of May.

That the cholera manifestations of the end of March and first weeks of April of the Banda District, of Gwalior, of Ajmere, and Malwa were immediately connected together as portions of one epidemic leap accomplished at this season by the reviving cholera from within the invaded area of 1868 there are no grounds for concluding. The features of the cholera in these months epidemic over Western India suggest that the cholera found in the Nerbudda valley in January and February was but an earlier exhibition of revitalisation of the same materies which became evident in Malwa in March, in Ajmere and Bhopal in April, and in Saugor in May. But that the boundary line in the east was so far transgressed in March and April as to admit of the appearance of the epidemic cholera as far to the west as Banda is also true; as much of the northern epidemic route as lies in the natural province under eastern influences was certainly entered early in 1869. Thus for some portions of the Banda District the register gives in April 221 deaths; and the Civil Surgeon remarks that the death reports of the Banda District are generally correct. The first case occurred in the district on 3rd April, and then cholera spread widely and rapidly. But in Banda itself the first case did not occur until the 4th May, and this case was imported. The first resident was attacked on the 8th,[*] and from the 10th of May until August 28th cholera continued to make its appearance. And, again, in the eastern portion of the Futtehpore District cholera appeared as early as the 16th February (a single case), and in March 281 deaths were registered.

General occupation of the Northern Epidemic Highway.

The general table for 1869 is a sufficient index of the universality of the revitalised cholera throughout the Gangetic Provinces, Oude, and the Central Provinces in April and May. And what I have now to endeavour to show is one of the most important links in the chain of the history of this epidemic. It is the fulfilment of the anticipation founded on the history of the epidemics of the past fifty years, that the cholera of the yellow patch of 1868 would about the 20th May make its epidemic movement, *per saltum*, into the western division of the epidemic area. The history of the appearance of a cholera invading at this time in Jhansi, Lullutpore, Oraie, Humeerpore, Agra, the districts of Central India and Rajpootana not affected in the earlier months, and also in Meerut and the Punjab, is required. Such movement is not a mere empirical fact. When it does occur it occurs along with the aerial commotion which follows the approach of the south-west monsoon to the western coasts of India, where it is expected to arrive about 25th May.

Simultaneous appearance of cholera over widely separated districts of Rajpootana.

The opening paragraph of the section of Dr. Moore's report on the Dispensaries of Rajpootana relating to the cholera of the year is as follows:—

"The history of the cholera epidemic in Rajpootana during the past year presents various points of great interest and importance. The general and almost simultaneous appearance of the malady over such an extensive area is altogether opposed to the theory of communication by human intercourse being the only means by which cholera is disseminated. In May and June the disease showed itself in many widely distant localities. In the former month, Rutlam and Joura in Central India were affected, as also Jeypole and Balmere in Mullannee at the opposite or western extremity of Rajpootana. In the north of Rajpootana, Rajgurh in Ulwar was affected on the 28th May, while on the 2nd June, the disease commenced so far south as Morwarra in Palanpoor. The place mentioned may be seen on the map attached, being on the extreme frontiers of the province, and, as if to render the theory of dissemination by human intercourse still less worthy of credence, we have cholera reported in Persia on 1st July."[†]

From the map which accompanies Dr. Moore's report, I have extracted the following dates showing the first appearance of cholera in different localities in the vast territory comprised within the region known as Rajpootana. It is wonderful to find that out of 44 dates entered, in 23 instances the outbreak commenced between the 25th May and 15th June:—

Simultaneous commencement of the outbreak of Cholera in different parts of Rajpootana in 1869.

Kerowlie	... June 7th	Pallee	... First week of June
Bhurtpore	... June 12th	Soojut	.. May 29th
Hindown	... June 15th	Kankrowlie	.. June 10th
Boondee	... Middle of June	Kherwarrah	.. June 8th
Chidawa	... June 14th	Dongurpore	.. May 24th
Rajghur	... May 28th	Pertabghur	.. May 25th
Jeypore	... June 12th	Erinpoorah	.. June 23rd, but in neighbourhood before this date.
Doodoo	... May 26th		
Kishenghur	... First week of June	Oodeypore	.. June 4th
Deolee	... June 2nd	Aboo, Villages around (6)	June 3rd
Nusseerabad	... June 12th	Deesa	... June 2nd to 24th
Joudpore	... June 12th	Morwarra	... June 2nd

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[*] Compare the history of invasion in 1867. On 11th and 12th May the Banda District became affected in 1867 (pages 130 and 131).

[†] The outbreak commenced on 18th June. (Proceedings, Sanitary Commissioner, 312 of 1869).

Thus in the first week of June, one vast sheet of invading cholera appears covering Central India from Bhurtpore to Deesa. We can trace the same cholera even further to the west. For when writing regarding the cholera of Scinde of September, the Commissioner relates that in the Thurr and Parkur Division cholera appeared in four villages in June. The Political Superintendent reports this cholera to the Commissioner in Scinde in a letter dated 15th June. From merely casual information and details regarding one or two localities, I concluded very soon after the occurrence that a great movement had taken place, and I was enabled to incorporate this anticipation in my previous report (note to page 199).

Cholera of the same period in the Bhopal State and the neighbourhood.

The date of the outbreak in Bhopal is not mentioned, but in his report for July (*Gazette of India*, page 1205), the Residency Surgeon says, that throughout June cholera prevailed to a great extent in the city of Bhopal, while in July there were 678 deaths. The dates on which cholera appeared among the troops may help to supply this date. On 26th May a man of the Bhopal Battalion died, and on the 30th a man of the 1st Central India Horse who was at Sehore on escort duty. On 31st May and 5th June the first men of the Central India Horse died at Goonah. On 6th June two men of the Bhopal Battalion escorting prisoners were seized on the road and were taken into Augur, where they died.

Invading cholera of the same period in the Agra and Meerut Divisions.

I have already quoted the letter of the Deputy Inspector of the Agra Circle, dated the 14th June, that cholera had broken out at Jhansi and throughout his circle.

The registration of the city of Agra shows deaths daily from the 5th to 20th June, and the first actual break occurs after the 8th September, seven deaths only appearing between the 9th and 30th. Before the 5th June three deaths only were noted in Agra—on 11th and 25th May and 3rd June. In the 40th Native Infantry the first fatal case occurred on 31st May, the second on the 9th, and the third on the 12th June.

ALLYGHUR.—"No case of cholera occurred in the Allyghur District before June. The first case occurred on the 3rd June and the last on the 20th September."—Civil Surgeon's report.

MYNPOORIE.—The first case occurred in the district on 8th June and in the city on the 12th.—Civil Surgeon's report.

MEERUT.—In May nine deaths were registered and in June 21. I think it extremely probable that some cholera appeared in Meerut at this time; the history of all former epidemics at Meerut shows how apt to appear is this spring cholera in advance of the monsoon manifestation. The Civil Surgeon, however, remarks:—"There were said to be some cases in the early months of the year, but I doubt this."

Cholera of the same period in the districts south of the Jumna.

JHANSI.—Continuing from west to east the history of the districts of Central India, we find the same dates still holding good:—"The first case was reported on 28th May at Muttunia on the north-east of the district, distant from Jhansi 45 miles. On the 10th June cholera broke out in Jhansi in the poor house."—Civil Surgeon's report.

LULLUTPORE.—"Not a single death was reported from cholera for some years past. On 25th May 1869 the first case reported appeared at Mehrownie, a town midway between Lullutpore and Saugor." Great as was the mortality registered, the Civil Surgeons of Jhansi and Lullutpore state that the deaths are far underrated.

HUMEERPORE.—The Civil Surgeon gives no details for his district, and makes no reply to the seventeen questions which stand first in the list proposed by the Sanitary Commissioner. He notices, however, the fact that the first case appeared in the station on 13th June, and the registration teaches that the history of invasion was here not different from that of the adjacent districts:—

	April.	May.	June.	July.	August.	September.	October.	November.	December.
Cholera deaths registered	...	32	55	759	957	212	39	4	...

ORAIE.—The registration of the Oraie District is exactly parallel with that of Humeerpore:—

	April.	May.	June.	July.	August.	September.	October.	November.	December.
Cholera deaths registered	3	36	671	319	1250	322	75	...	...

The Civil Surgeon, however, gives no account of the deaths registered in May and June, and says that in his belief cholera did not break out before the middle of July. I find, however, on turning to his Jail Return of June the following:—"Pernicious intermittent, remittent, and ardent fevers suddenly broke out in the district from the excessive heat of the season, and have assumed an epidemic form since the 31st May, and have prevailed with more or less severity throughout the month. Five cases occurred in the jail, of which three died."

The first of these cases was admitted on the 5th and died on the 6th June. The death report in this case is as follows, and I shall quote this case only:—"The man had been unwell during the night with symptoms of indigestion and fever, but informed no one of it until the following morning. On admission there was nausea and inclination to vomit with a hot and dry surface and quick pulse. There was a rumbling in the bowels unattended with pain. He looked anxious. As soon as the bowels commenced to act the vomiting again began. The stools were at first liquid and feculent, but gradually changed to a watery fluid.

Thirst also became unquenchable and the patient rapidly collapsed. The surface became cold and clammy and all the symptoms of cholera became apparent." The report goes on to state that the man rallied, but twelve hours after became suddenly comatose and died before the Surgeon could reach the hospital. It is evident that the cholera of the Oraie District dates from 31st May.

General conclusions regarding the cholera of the epidemic highway of the first week of June.

This, then, is what occurred in the stations on the northern epidemic highway. Were it not for the fact that the simple question was put to Civil Surgeons—when did cholera appear in your district in 1869? one would almost be inclined to imagine that the leading question had been put—did cholera appear in your district towards the end of May or in the first week of June?—and that each had written up to the theory involved. As the case stands, these reports are the pure expression of a fact in epidemiology which cannot be explained except by the admission that, universally and at the same time, the choleraic influence of the same epidemic was in motion from the banks of the Jumna to the Runn of Cutch (Thurr and Parkur). I have placed here these statements as the medical officers have written them, and I may safely assert that not one of these statements has been influenced in its direction by anything which I may have written in my report of last year.

I am well aware that no portion of my late report has been received with greater suspicion than that in which I affirmed that the great cholera of the Punjab universally manifested from Delhi to Peshawur between the 12th and 19th May 1867 was a cholera air-borne and distributed at a normal season; and the fact that months before I had formed the anticipation weighed little against the palpable fact that the roads from Hurdwar to Umritsur were lined with dying pilgrims in the third week of April. One reviewer writes:—"In this allegation we have either the expression of a very remarkable fact, or a most ingenious instance of special pleading." No suspicion of the possible effects of human intercourse can attach to this illustration from the history of 1869, and we are fortunate in having such an illustration following at so short an interval.

Modified influence of the cholera of the same movement in the districts beyond the northern margin of the epidemic highway.

The Civil Surgeons of Muttra and Goorgaon, south of Delhi, are unacquainted with the origin and progress of cholera in their districts; but the registration of the adjoining districts seems to show that in the last week of May, or early in June, they were slightly affected by the same cholera wave:—

Deaths of the General Population.

	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Muttra ...	13	122	284	337	144	110	23	7
Goorgaon ...	15	35	59	141	143	216	11	...
Rohtuck ...	15	20	7	3	...	...	...	...
Delhi ...	10	16	11	1	1	3	...	1
Hissar ...	1	3	45	142	69	38	...	...
Sirsa ...	1	...	...	6	26	38	1	...

Thus this cholera is traced up to the edge of the desert. From Bikaneer we have no information beyond the fact mentioned incidentally by the Civil Surgeon of Sirsa, that in August, six cases of cholera appeared at a town of his district bordering on Bikaneer, and that two months before cholera had appeared in that State.

Cholera of the same date on the opposite margin of the natural province from that by which invading influences enter. Cholera of Sealkote, Umritsur, and the Simla Hills.

But I have many times remarked that in tracing an invading wave of cholera, we should not fail to look to the opposite and terminal margin of the natural province, where we may find the very same cholera precipitated in strength, although the indications over the province itself may be of very slight importance. This is what appears to have taken place in the Punjab in the last week of May in 1869. While aërial commotion is occurring over the vast tract in the south, in the north the cholera of the same movement is being precipitated in strength at the terminal extremity of the monsoon province and far up among the Himalayas close to the snowy range. It was at this time that the great cholera of Umritsur which, as elsewhere, culminated in August first appeared. The report of the Committee appointed to inquire into the causes of this cholera states:—"A few cases of a doubtful character occurred in May, but it was not until the 27th that the Civil Surgeon was satisfied that genuine cholera existed in the city." * * * "On the 10th June it broke out in the northern quarter of the city."

Even beyond Umritsur, this cholera wave extended, for on 4th June at Sealkote an officer of H. M.'s 38th Regiment was struck down. This was a very severe and characteristic case of cholera, but the patient survived.

In the first week of June there was a distinctly marked tendency to cholera in Simla; and I was able to append notes at pages 165 and 166 of the second section of my report of last year mentioning this, although at the time ignorant of the general epidemic connection. On the 19th the report was sent to Simla, but cholera was prevailing in strength fourteen marches beyond in the interior of the hills; and even up to October accounts continued to be received of its existence on the hills beyond the Sutledge.

Such is the history of this vast movement of cholera as far as I am acquainted with it. There exists not one iota of evidence which might tend to show that this was a cholera revitalised from that of a previous epidemic. The cholera of this area was beyond doubt derived from the cholera of 1868 as defined on the map for that year, and the movement, as I have now described it, is only what has occurred in previous epidemics, and will occur as often in the future, when this description may be taken as a standard of reference.

Cholera in Persia in the middle of June.

I may note again here, that a despatch from Persia, dated 8th July, announces that since 18th June several cases of cholera had taken place in Teheran, and that in the town the number of deaths had increased from 8 to 27 daily.

Meteorology accompanying the movement of cholera in the last week of May and the beginning of June.

It was in the last week of May that the monsoon appeared on the western coast, and in the first week of June rain was general throughout the Bombay Presidency and in Southern Scinde.

In the Central Provinces the wind had set in from the south-west, and in all districts the promise of the monsoon appeared.

District Reports for week ending 5th June.

NAGPORE.—Nights cloudy, and there is every indication of rain.

BHUNDARA.—Prevailing wind west by south-west; clouds bank up daily.

CHANDA.—Weather cloudy and windy.

WURDAH.—Cloudy daily; wind south-westerly; a small drizzle fell in Wurdah, and a heavy shower in Hingunghat.

BALAGHAT.—Cloudy sky towards evening.

SAUGOR.—South wind; on the 4th and 5th slight showers of rain.

BAITOOL.—Wind from west and south-west.

CHINDWARA.—Wind variable; in the morning north, and in the evening veering round towards south-west.

NURSINGPORE.—Wind steady from the south-west, till the afternoon, when it veers to south. Heavy clouds hang about.

NIMAR.—Heavy clouds have been hanging about all the week.

RAIPORE.—Prevailing wind at the beginning of the week mostly from the south, but latterly more constant from the west.

Associated probably with the aërial disturbance in the south, nearly every district of the Punjab got the first rain of the season on the 8th and 9th June.

Districts of the Punjab. Rain-fall in Inches.

	8th.	9th.		8th.	9th
Jullundur	...	·3	Mooltan	·5	..
Loodianah	...	·5	Mozuffurghur	...	1·0
Hoshiarpore	·3	·3	Montgomery	...	·1
Kangra	...	·1	Dera Ghazee Khan	·8	·1
Goordaspore	...	1·5	Dera Ismael Khan	·5	1·5
Sealkote	...	7·3	Huzara	2·0	·4
Umritsur	...	4·4	Rawul Pindee	·2	·7
Goojrat	...	1·3	Peshawur	·7	...
Goojranwalla	1·4	·4	Bunnoo	·1	...
Lahore	...	1·7			

Phenomena accompanying the setting in of the monsoon over Upper India.

But this was not the burst of the monsoon proper. The Punjab got no more rain until the first week of July, and it was on the 15th that steady rain set in. In the North-Western Provinces the change towards the monsoon began in the last week of June. The Reporter for the North-Western Provinces says:—"About the 17th the indication of a change took place, but in many places it was so unimportant as not to attract notice. When it was noticed the wind had become more or less easterly and clouds appeared, and it felt cooler when slight rain fell. The change of weather was more decided on the 23rd and 24th, and on the latter day rain fell in nearly all the stations, and especially in the more eastern districts. * * The monsoon may be said to have commenced a day or two past the middle of June, but its effects were not very apparent till the last seven or eight days of the month."

The following report of the Government of the North-Western Provinces to the Government of India on the prospects of the season, dated 10th July, is of extreme interest to us, as showing how true is the natural province west of the line of 80° E. Long.—the limit of natural influences from the east, and the limit of cholera progressing from the east:—

"There was a good fall of rain in Goruckpore on the 24th June, but the first approach of the regular monsoon was on the 29th and 30th of that month. On the 30th it rained heavily and continuously throughout the Benares and Allahabad Divisions, the storm passing steadily from the east and reaching to Etawah, and through Oudh as far as Bareilly and Shahjehanpore; west of that line it did not pass." * * * West of Mynpoorie no regular fall has yet occurred. There have been showers in some places of tolerable quantity; but the setting in of the rains is not reported from any place in this quarter. * * On the whole, the intelligence is good as far west as Furruckabad (Futtehghur). * * Bundlecund has also fared on the whole well. The fall in Banda was good. * * In Humeerpore the average fall was 2½ inches. * * At Agra there is reported a heavy fall on the 5th, and there have been showers in Muttra. * * No regular setting in of the rains appears to have taken place in the Meerut Division. There have been showers of more or less intensity and duration, * * but it is to be feared that west of Mynpoorie and Etawah there has yet been no regular monsoon."

Again, in the week ending 22nd July, the Lieutenant-Governor of the North-Western Provinces reports,—that during the week that has passed, rain has fallen sufficient to remove for the present all apprehension of agricultural failure.

The appearance of the monsoon cholera of the year.

Now, it is a matter of observation that about a fortnight or three weeks after the setting in of the rains, the strength of an epidemic cholera begins to re-appear in Upper India. From the registration of the general population the interval between the cholera of the spring and monsoon is scarcely apparent, although when studied in the type, which gives a true representation of the fact, it is readily seen. In the first part of the present paper, page 200, I have shown how, throughout the stations of the European army, the cholera of the spring died and was succeeded at an interval by the cholera of the monsoon. The same fact is apparent in the table at page 232.

Illustration from the history of the Umritsur cholera of repression after invasion, of culmination with monsoon influences, and of natural decay.

The repression of the manifestation of the spring-distributed cholera was beautifully illustrated in the case of Umritsur, where, although localising causes were at the maximum, the cholera distributed in the last week of May was repressed up to the 13th July, when it began to show itself in power. The Umritsur Committee write thus :—"Throughout June the deaths in one day never rose above four, and the total deaths in June were 38; the disease was confined to no particular quarter, but isolated cases occurred in all directions. During the early part of July the number of casualties was small. On the 13th and 17th and 27th there was rain, and cholera increased rapidly, the deaths being on the 13th, 10; 15th, 16; 16th, 27th; August 2nd. 35; 3rd, 52. From this date the disease was universally diffused, and reached its climax in the death of 118 persons upon the 16th. Its fall was more rapid than its rise, and the last reported case was on the 8th October." This will always remain on record as a perfect and standard history of cholera in relation not to a population but to a locality. No localising conditaons could maintain this vital cholera in life; on the 6th September it began to die, and it was dead absolutely on 21st September.*

Compare the winding up of the epidemic of 1856 in the Lahore and Ferozepore Districts, as given at page 165, to show how rigidly the law of extinction is enforced, and that the same law holds good, whether types of the population only be taken, or the population as a whole :—

"In the 70th Regiment at Ferozepore the last cholera case occurred on 22nd September, in the Artillery on 17th September, and among the Native troops on 18th September. The last case in Her Majesty's 81st Regiment at Meean Meer was on 23rd September; among Native troops between the 14th and 21st (8th Cavalry, 21st; 16th Native Infantry, 14th; Police Battalion, 14th; 26th Native Infantry, 16th). This shows what is meant by the end of the reproduction. It is the date up to which outbreaks can occur in consequence of the presence of vitalised cholera over the area."

Indices in types of the community which show that the parallels of 1856 and 1861 in this locality might readily have been repeated in 1869.

Before leaving the history of cholera in Umritsur, it is of interest to notice the dates at which the cholera of the monsoon season affected our types of the population, with reference to the anticipation of the possible appearance of cholera at Meean Meer on the 7th or 8th August following the parallel of 1856 and 1861. Meean Meer entirely escaped, and also the Central Jail at Lahore. But in the female jail a woman died of diarrhœa on 8th August, a second died on the 13th, whose case also was returned as diarrhœa, and on the 18th and 19th two cases proved fatal, recognised as malignant cholera of one day's duration. In Umritsur, "cholera appeared in the jail for the first time on the 10th August; and in the fort of Govindghur, distant a quarter of a mile from Umritsur, the first case was that of a gunner on the 6th August, followed by eight more cases up to September 3rd." How nearly the parallel of the past was realised may be gathered from indices such as these.

Significance of the Subathoo cholera of the same period, commencing on 6th August.

But I have spoken of the same cholera which was localised here in June as having passed over the Simla Hills, and not less wonderful is the parallel which holds in this locality. That the cholera of Subathoo was localised somewhere in the hills is, I think, shown by the fact, that at this very date it became manifest in power, while the history of a far spreading cholera is wanting. No cholera appeared at Kussowlie, Dugshaie or Simla for the additional 1,500 feet of elevation, and the fact that these stations are not overtopped and surrounded by neighbouring hills was sufficient on such an occasion as this to secure immunity. There is reason to believe that at Subathoo also the cholerraic influence which pervaded the hills early in June was felt.[*] Be this as it may, the parallel holds, that in the regiment cholera broke out on 6th August, and that the termination of the cholera occurred almost to a day with that of the Umritsur cholera, for the last man died on 18th September.

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* I observe no notice in the returns of the case of 8th October; the register ceases on 21st September, up to which date a total of 3,026 cholera deaths were registered in the city.

Dates of the commencement of the monsoon outbreaks among the jail population.

What I have shown in the case of the European army, I illustrate again from the history of the jail population, namely, the awaking into epidemic life throughout the monsoon area from the Behar Provinces to Umritsur of the cholera of the spring as soon as the monsoon had fairly set in.[†] Below are given the dates of jail outbreaks, distinctly belonging to the monsoon season, and cut off from the spring cholera of 1869. The deaths of the same area were in June 12 and in July 105:—

Dates of the jail outbreaks of the epidemic area in the monsoon season of 1869.
(Compare Table for European Troops, page 200.*)*

Ranchee, 20th to 27th July.
Purneah, 20th July.
Arrah, 16th to 23rd July.
Chumparun, 15th to 30th July.
Chupra, 18th to 26th July.
Benares, 1st to 7th August.
Jounpore, 3rd August.
Goruckpore, 10th to 31st July.
Rae Bareilly, 12th July.

Oonao, 4th August.
Nagode, 27th July.
Allahabad, 18th July to 2nd August.
Shahjehanpore, 10th July.
Bareilly, 14th to 21st August.
Belaspore, 8th July.
Bandhara, 24th July to 2nd August.
Chanda, 17th July to 13th August.
Jubbulpore, 12th to 28th July.

Lullutpore, 17th to 25th August.
Jhansi, 17th to 26th August.
Ajmere, 20th to 26th August.
Agra, 25th July.
„ 23rd to 27th August.
„ District, 13th to 27th August.
Umritsur, 6th to 22nd August.
Lahore Female, 14th to 18th Augt.

Monsoon movement about 17th August corresponding probably with that usually observed in the last week of July and first week of August. The special meteorology by which it was accompanied.

Looking at this table the curious fact is observed, that the dates are clearly divisible into two. While the prevailing dates in the eastern division of the epidemic area range from the middle of July to the first days of August, in Lullutpore, Jhansi, Agra, and Ajmere, all the jails were attacked between the 17th and 23rd August, the outbreak ceasing on the 25th, 26th, and 27th August. Now, this is precisely the time that we register the invasion of the Meerut District. The Civil Surgeon of Meerut writes:—"The first case came to notice at Ghazeeabad on 19th August, and in a few days cholera appeared at Meerut and its neighbourhood." A workman employed on the Delhi Railway between Ghazeeabad and Meerut was seized with cholera on 20th and died on 21st. Two cases, however, had appeared in the Sudder Bazaar at Meerut on 18th August. "The first case in the city occurred on 24th August. Cholera appeared at Ghazeeabad, in the Bazaars, and in the city, all in the course of a week." Here is a definite statement, and a clear history of a further movement of cholera, if cholera moves aërially and not by human intercourse. It was at this date also that cholera made its appearance in Allyghur, and it was reported that up to the 20th, 20 cases had terminated fatally.

Meteorology causing the repression of movement in the end of July and first week of August, and attending the movement of 17th August.

We may then try to trace whether this movement of 17th August was accompanied with meteorological phenomena that can be recognised.

The Secretary to the Lieutenant-Governor, North-Western Provinces, addressing the Government of India, in the Home Department, dating 23rd August, writes as follows:—

"Everything is still prosperous in the eastern districts (those corresponding to our natural province), where the harvest promises to be unexceptionably good. But the western districts have, during the past two or three weeks, been the subject of renewed anxiety.

"Early in the present month there was a general cessation of rain, accompanied by a hazy dry west wind, which continued so long in the upper districts as to occasion apprehension, and in some quarters injury to the crops.

"About the 16th or 17th this passed off, and cloudy weather re-appeared, bringing with it heavy falls of rain, which in most places have proved sufficient for the present. The greater part of the Agra Division (especially the eastern portion) has been plentifully watered; and in eastern Rohilcund enough has fallen for present necessities. There has also been rain in western Rohilcund, but more partial. The Meerut Division has fared worse; but a heavy fall of three inches is reported this morning at Mozuffernuggur, and there have been showers in Seharunpore, Bolundshuhur, and Allygurh sufficient to revive the crops. The Meerut District has, excepting a few showers on the north-east, received none of this fall as yet.

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[*] Nineteen children out of 130 belonging to this regiment died in May and June. The Surgeon of the 41st died soon after the termination of the cholera outbreak of August and September; but Assistant Surgeon Gallwey, who was with the regiment at the time, informs me that he has no doubt of the presence of cholera at this season among the children, and that many cases which were rapidly fatal were attended with coldness and collapse.

[†] Dr. Ambrose of Her Majesty's 58th Regiment, who has published an account of the great outbreak in the regiment, recognises this interval between the spring and monsoon cholera as follows:—"From the 11th of June to the 23rd of July, the 58th was totally exempt from cholera, and the epidemic was supposed to have worn itself out. But it was merely a respite. Why the respite should have occurred is simply unaccountable, but nevertheless well worthy of notice."

"The accounts from the Jhansie Division and Ajmere are good.

"The latest accounts from the Muttra District and western parts of Agra are not favorable. There has been very little rain in that quarter, and the crops are consequently poor and precarious."

Was the hazy dry west wind of the first week of August the cause of the immunity of Meean Meer and Lahore in 1869?

How narrowly Meean Meer escaped a repetition of the calamities of 1856 and 1861 in this first week of August 1869 has not been sufficiently appreciated. Escape was not attributable to any precautionary measures that may have been employed, as the Sanitary Commissioner has shown. No foresight could have predicted the occurrence of such a series of natural phenomena as would divert the miasm from the region in which it normally settles; the most that could be foretold was, that the parallel of 1850 and 1860 might be repeated. And up to the end of August the parallel did hold, and the meteorology of the month held the advancing cholera in check.

State of the Punjab towards the end of August, a province from which the invading cholera of the year was repelled at this season.

The following was the state of the Punjab in this same week (23rd August), showing that the dry west wind was devastating the country while cholera was utterly repelled. *The Englishman* of 27th August contains the following:—

"We are sorry to see that the latest account of the condition of the Punjab Provinces is stated to be 'critical in the extreme.' Rain was much wanted; in fact, unless it fell within one week the crops would be most seriously injured. Prices were still rising and would rise still higher unless rain fell, and fresh applications were being forwarded to Government for money for relief works. At Hissar, during the first week in August, 62,710 infirm persons received relief, and only 49 were employed on relief works. The crops that had been sown were drying up, and the Deputy Commissioner writes that 'the prospect of another year of famine becomes every day more distinct.' The canals also do not appear to supply sufficient water for the irrigation wanted. In Rohtuck 22,876 persons received relief, but there were no special relief works in hand. From Loodianah, where no relief operations had hitherto been required, an urgent appeal for assistance has been forwarded to the relief committee at Lahore. In Kurnal, 1,558 persons were employed on relief works, and 49,050 were fed, and unless rain fell at once it was said that the crops would perish. Relief operations will have to be resumed in Lahore, and have been already sanctioned in Umritsur. An application for money has been sent in from Ferozepore for relief purposes, but it is stated that there is no cause for anxiety at present. At Sirsa, 7,664 persons were employed and 12,874 fed at the expense of the relief funds."

But in the Punjab as well as in Meerut the influence of the weather of 16th and 17th August was beginning to be felt. Cases of cholera began to appear here and there where no cholera had been shown before; and in the districts into which the spring cholera had intruded fresh vigour was imparted to the latent miasm.

In the report for Lahore we are told that on 22nd July a man from Umritsur was found at the Railway Station suffering from cholera; but the death register for the city begins on 11th August, and up to the 17th only 7 deaths were recorded. The 22nd is the date of the general appearance of cholera, for on this day 7 deaths were reported and on the 23rd 14. From this time up to the 21st September deaths were reported daily, and the last death recorded was on 8th October.* In all, however, the register for the city of Lahore shows only 184 deaths.

Our indices show at this very date in August choleraic influence abroad over other districts:—

Shadow of the cholera of the second and third weeks of August in the southern districts of the Punjab.

Jullundur.—"One case of cholera was admitted and died on 23rd. He had all the worst symptoms very marked. He became collapsed, and died 11 hours after admission. Up to the present no other case has been reported on this side of the Beas."—Weekly Report, 92nd Highlanders, 27th August.

Ferozepore.—"A man was admitted at 2 P. M. on 17th August with vomiting, cramps, coldness of extremities, clammy perspiration, and sunken features. He stated that his bowels had not been open for three days, and that the day before he had spent four hours in one of the baths for the purpose of cooling himself, and afterwards slept in the open air with only a pair of wet drawers on. Before visit on the morning of the 18th his bowels had acted after a castor-oil enema, and he had passed water; but after visit he sank rapidly, and died at 9 A. M. All the symptoms were undoubtedly choleraic, but the case being a solitary one and clearly to be traced to his having acted as above described, I did not think I was warranted in calling it cholera."—Report from Surgeon 1-5th Regiment.

Sirsa.—"The first case of cholera reported in the Sirsa District was from Ellenabad, and here cholera appeared on 17th August. There were in August six deaths only in the Sirsa District."

Movement of the first week of September. The meteorology which accompanied the movement of cholera over the invaded area.

But I have now to show the cholera of the Punjab under a new phase and as a cholera in motion. When I gave the warning, that, following parallel history, further movement might be anticipated in the first week of September (pages 198 and 202 of this report) I certainly did not apprehend the vast extent and importance of the movement which actually did occur. We had a perfect appreciation of the geography of the epidemic up to August, and what I am going now to detail shows that within one week the cholera cloud descended upon a vast and unoccupied area.

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* Note the absolute coincidence of these dates with the dates of the disappearance of cholera at Umritsur.

I have shown how critical was the state of matters in Northern India up to a late date in August. The following is the report of the 8th September from the North-Western Provinces:—

"In continuation of last week's report, the Lieutenant-Governor, North-Western Provinces, has much satisfaction in informing the Right Hon'ble the Governor General in Council that the prospects of the coming harvest continue to brighten. After a short break in the weather, a heavy rain storm burst on the Upper Doab on the 4th instant, and there has since been abundant rain everywhere. From all quarters the accounts of the crops are cheerful and promising. Even at Ajmere the prospect is encouraging. Rain fell early in the month, and on the 6th the following telegram was received:—'the last rain-fall has been general, and sufficient to secure a good harvest."'

Much further to the west this same rain was felt. On 17th September the *Pioneer* writes:—

"We hear from Mount Aboo that the weather there is intensely disagreeable—almost incessant rain, and the few intervals filled up with dense mist. For Marwar generally the weather is most beneficent. The rain-fall has been general and the crops are looking healthy."

The northern limit of this rain was the desert, and this was probably the cause of the exemption of Bhawulpore and Mooltan and the districts to the west beyond the desert, while all districts to the south of the desert and all districts to the north suffered from cholera in one and the same week.

This limit is indicated in the continuation. "Jodhpore has been the least favoured; there the tanks are still dry and famine prices rule, as indeed they do, notwithstanding the elsewhere sufficient rain, throughout the Marwar territory."

On the 4th and 5th September the same rain was general over the Punjab.

Indian Public Opinion says:—"We are glad to note that abundant rain has fallen during these last two days in and round Lahore. The rain this week has been most providential, and may be said to have saved the crops and ensured a good harvest. The fall of rain appears to have been very general. Hissar, Goorgaon, Rohtuck, Delhi, and the districts most in need have received a plentiful supply, from two inches to five inches. Nor has the rain ceased. Yesterday and to-day have been wet days at Lahore, and the prospects of the country are now tolerably bright."

Appearance of cholera in the city of Peshawur and the subsequent history of the outbreak.

Immediately upon this followed the telegram of the 7th from Peshawur, announcing the appearance of cholera in the city. Mr. Ince writes in his report on the epidemic:—"The first authenticated death occurred on 1st September." But I am well assured that the aura of the movement between 17th and 23rd August was felt even as far as Peshawur;* Dr. Watson, of the 19th Bengal Cavalry, returned during August amongst the Native troops under his care, three cases of choleraic diarrhœa unattended with a fatal result, and there can be no doubt of the correctness of his observation.

The city register for Peshawur shows deaths daily from 1st September up to the 4th November, except on 3rd September. Mr. Ince writes:—"From the 7th to 26th September the daily average number of deaths was over 52; the greatest number took place on the 13th September, and it was 92. From 1st September to 31st October, the total number of deaths was 1,450; in November 15 occurred, and in December 1, making the total 1,466, or 2·59 per cent. of the population." Thus the anticipation contained in my letters of 8th and 22nd September that this cholera would die at Peshawur in the first week of November was exactly realised.

The outbreak in the Peshawur Cantonment.

Immediately after the outbreak of cholera in the city was reported, a great rain-fall took place, abnormal for the season, for Peshawur is beyond the normal monsoon limits. Seven inches of rain fell between the 9th and 11 A. M. of the 11th, and on the 12th the outbreak in cantonments was telegraphed as follows:—

"Cholera has assumed an epidemic form amongst the troops here. A man of 36th Regiment seized yesterday morning died last evening. Two men and one woman, 104th Regiment, seized yesterday evening; one died last night. Two men of Royal Artillery attacked last night. The Battery and a Wing of 104th move into camp to-morrow."

The following notice by a correspondent of the *Delhi Gazette*, dated 12th September, shows very well the state of matters immediately before the outburst:—

"I am sorry to announce that cholera has been raging in the city amongst the natives since the 5th instant; the daily average number of victims supposed to have been carried off is 30. Several similar cases have occurred in the cantonment, and a Committee, composed of military authorities of the station, having assembled on the 7th instant, a resolution was passed that visits to the city should be avoided as far as practicable during its prevalence. The Committee, having concurred with the opinion, have established a cordon through which no natives, except those who are provided with a pass from the Deputy Commissioner, Cantonment Magistrate, or Brigade Major, are allowed to pass. The Officiating Brigadier-General Commanding the Peshawur District has already issued orders for the British troops to be in readiness to move into camp, and the Executive Commissariat Officer has been ordered likewise to keep the moveable column in attendance to assist the forces in the conveyance of their luggage, &c., &c. We had a heavy fall of rain from the night of the 9th instant up to the 11 A. M. of the 11th; this will very probably put a stop to the prevailing cholera, which has carried off hundreds since the 5th."

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* The universality of the sparse rain-fall at this date is beautifully shown in the daily rain chart at page 230.

The dates of the outbreaks in the different corps in the Peshawur Cantonment were as under:—

EUROPEANS.		NATIVES.	
36th Regiment	... 11th September.	Sappers and Miners	18th September, 10 A. M.
104th Regiment	... 11th September, 4 A. M.	18th Cavalry	8th September, 4 A. M.
A. Brig., B. Bat.	... 18th September, 2 A. M.	19th Cavalry	6th September, 5 P. M.
A. Brig., E. Bat.	... 12th September, 2 A. M.	3rd Native Infantry	19th September.
XIX Brig., B. Bat.	... 12th September, 7 P. M.	19th Native Infantry	11th September, 6 A. M.
XXII Brig., 4 Bat.	... 13th September, 1 A. M.	25th Native Infantry	19th September, 3 P. M.
		28th Native Infantry	11th September.

The significance of the interval between the cholera of the Peshawur Cantonment of 11th September and the great outburst on 18th.

This table recalls at once the phenomenon which I have described in various parts of the report for last year, namely, the sprouting of the cholera after an interval from the time of its being precipitated over any locality. The outbreaks are distinctly divisible into two, those following the invasion of 11th September and those consequent upon a renewed manifestation of cholera on the 18th. A second storm burst over Peshawur on the 18th, and coincidently with this storm the universal occupation of the Peshawur valley by the cholera occurred.

In the 86th Regiment four men only died up to the 18th, and on this day the terrible outbreak began, in which 111 men were lost; and in the 104th Regiment seven men only were lost up to the 18th, and on this day began the outbreak, in which 66 men died. The wing of the 104th which left the cantonment for Cherat on 13th entirely escaped the great outburst of the 18th, showing that the men had not become affected as a body even at this date. To this phenomenon of the re-appearance of this cholera a week after evident invasion, I shall return in speaking in the next section of the aspects of the outbreaks of 1869.

Cholera outbreaks of the Punjab of the first week of September, which appear to come forward with the same meteorology which determined the outbreak in the Peshawur valley.

Before tracing further this cholera of the first week of September invading beyond the Indus, I shall go back to the east of the Punjab, to show that here also the cholera of the first week of September was an invading cholera. I tabulate below instances which seem to have arisen under one common influence at this time:—

Invading cholera in the Eastern Districts of the Punjab of the first week of September.

DATE.			HISSAR CITY.‡	SIRSA CITY.‡	LAHORE LUNATIC ASYLUM.‡	GOORDASPORE CITY.§	EUROPEANS, UMRITSUR.‖
			Deaths.	Deaths.	Admissions.	Deaths.	Admissions.
ember 1	...	...	......	......	......	1	......
" 2	...	...	......	......	......	......	2
" 3	...	...	......	...	......	1	2
" 4	...	...	......	1	......	*......	......
" 5	...	...	......	1	8	......	......
" 6	...	...	1	......	3	2	......
" 7	...	...	1	2	1	1	......
" 8	...	...	......	3	5	......	......
" 9	...	...	......	1	6	......	......
" 10	...	...	2	1	......	......	......
" 11	...	...	......	......	2	......	......
" 12	...	...	......	......	3	1	......
" 13	...	...	......	2	1	2	1
" 14	...	...	......	4	4	......	......
" 15	...	...	2	3	2	......	......
" 16-30	...	...	20	6	9	1	......

In reply to an enquiry as to whether cholera had appeared in the Bhawulpore State at this time, the Civil Surgeon, Mr. Deane, writes to me:—" There was no appearance of cholera within the limits of the Bhawulpore State in September of this year. But, curiously enough, an outburst of cholera was reported on the southern end of the State in the last days of August and first week of September." Mr. Deane, however, is of opinion that this was not true cholera, but fever with gastric and intestinal irritation.

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* Not fatal. First fatal case admitted on 19th.

† Not fatal. Cholera suddenly re-appeared in this regiment in strength on 19th.

‡ No cholera in any previous month.

§ One case on 27th July.

‖ Break from 18th August, with exception of a case on 21st.

Invasion of Northern Scinde in the same week.

But the fact of the invasion of the districts of Scinde immediately adjoining Bhawulpore at this very date is opposed to Mr. Deane's conclusion. At my request, the Sanitary Commissioner addressed to the Sanitary Department for the Bombay Presidency the enquiry whether in this first week of September the districts of Northern Scinde had been invaded.

In reply, several papers of great interest were forwarded from the various districts of Scinde, and from these I make the following notes:—

The Magistrate of Shikarpore, addressing the Commissioner of Scinde, and writing on 4th October, says:—"Cholera first made its appearance in the town of Sukkur on 2nd ultimo, on which date three men fell victims to it. * * The scourge has been pretty general throughout the district, but it has nevertheless greatly abated in the neighbourhood of Sukkur, and is now, I trust, abating also in Kotree, where it showed itself in rather a virulent form. * * In Shikarpore one case occurred on the 19th September, and a similar case on the 20th in a small village adjacent."* From this district 683 deaths were reported.

Cholera of Kotree, commencing on 8th September.

Further to the south the cholera appeared at the same time. At Kotree the first case was observed on 8th September. I make the following quotation from the report of the municipal committee, dated 16th October:—"No remedial measures were of any avail to check the progress of the epidemic. Each day the number of cases increased and the death rate rose higher. By the 20th the population was panic stricken, and numbers fled from the place. The disease raged with the greatest severity for a period of 11 days, from the 18th to the 28th inclusive.† During this time 503 people were attacked and 399 died. After the 28th it rapidly abated, and on the 12th instant the last cases and the last deaths occurred."

The localisation of this cholera appears to have been due to the following conditions. The second paragraph of the municipal report is as follows:—

"On the 14th a large body of water, an overflow from the Barun Stream, swept down upon Kotree, flooding all the low-lying land between the European station and the hills as well as a considerable portion of the south and south-eastern quarters of the native town. The greater part of this water rapidly drained off into the river, but pools of stagnant water for which there was no outlet remained in various parts of the town for several days, while all the low country to windward of the town which had been flooded for many hours became exposed in a muddy state to the action of the sun. These most unfavorable sanitary conditions were intensified by an extreme and sultry heat which prevailed during the latter half of September and which would no doubt of itself go far to explain the extraordinary mortality which has characterised the epidemic in Kotree."

Cholera of Kurrachee, beginning on 21st September.

Regarding the cholera of Kurrachee the *Sindian* reports as follows:—"Cholera is still at work in the town of Kurrachee. During the past week, namely, from 25th to 31st October, there were 71 individuals sick; of these 25 succumbed and 46 remained on the sick list. The report of 1st November shows eight more taken sick, of whom three died." The first case of cholera appeared in Kurrachee on 21st September and the last on 23rd November.

Cholera of Caubul, Asfrabad, Meshed, and Kieff, appearing between the 1st and 15th September.

The cholera of the northern limb did not stop short on the Peshawur Frontier in the first week of September. Immediately we hear of it above the Khyber at Jellalabad, and before the middle of September its appearance in Caubul was reported. The latest intelligence received in the Foreign Department regarding the cholera of Caubul is dated 23rd November; and in this report it is stated that cholera after prevailing for a month and a half had almost entirely disappeared.

But far beyond from the shores of the Caspian the arrival of the cholera of the first week of September is announced. The Agent at Astrabad writes:—

"From the 8th of the month the cholera has made its appearance here. It first broke out among the soldiery and irregular cavalry. These being dispersed it spread in the town and is very virulent. Those who can afford have left for the country. The epidemic is also at Auzan, one of the villages of Astrabad."

And on the 21st September the Agent at Meshed writes to announce the same thing:—

"It is now some days since the cholera has appeared; and there are from 50 to 60 cases a day."

But this cholera finds its termination neither at Astrabad nor Meshed. The *Lancet* of 18th November supplies data which show that the cholera of this week was carried on into Russia:—

"The *Medical News* of St. Petersburg gives some interesting particulars relative to the outbreak of cholera in Russia. It attributes the outbreak to the extraordinary heat and drought which prevailed this summer in Central Russia, and which was in striking contrast to the frequent rains in North-Western Russia and Western Europe generally. Several cases of diarrhœa and summer cholera, some of which were fatal, occurred at Kieff in July, but there was no epidemic until the middle of September. At first it was supposed that the cholera had reached Kieff from Persia, but it appears this year Tiflis has been unusually healthy, and that there is no communication between Kieff and the Persian districts where cholera prevailed. The disease appeared indiscriminately both in the poor and the rich quarters of Kieff, and carried off several victims in the higher classes. In September the number of patients was 65, of whom upwards of 40 died. How many persons were attacked in October is not known, but there were upwards of 30 deaths from the epidemic."

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* These dates are to be noted as corresponding with the date of the appearance in strength of the cholera of the Peshawur valley.

† Precisely the dates of the great outburst in the Peshawur valley; see table page 233.

Influences prevailing up to third week of August, causing famine throughout Central and Northern India, probably associated with the drought in Central Asia.

The drought referred to was in all probability due to an extension of the same influences which prevailing in Hindostan gave origin to the terrible famine of Rajpootana, Central India, and the districts bordering upon the desert, and caused such grave apprehensions for famine throughout the Punjab and in the western half of the North-Western Provinces.

Even in the last week of August the Lieutenant Governor of the North-Western Provinces wrote thus :—

" The apprehensions, repeatedly expressed, as to the continued rise of prices and consequent distress, are being too surely realized. * * * It will be readily understood that the prices quoted imply increasing dearth and severe distress. Even in the more fortunate districts to the east, as in Benares, the city population is beginning to demand relief. In Jhansie and Ajmere the heavy pressure still continues, and throughout Rohilkhund it is rapidly advancing."

On 17th August Colonel Keatinge writes regarding the condition of Marwar :—

" Within the last few days, crowds of people in a partially starving condition have flocked into Erinpoora, and from reliable information given to me by European travellers, I learn that great destitution is observable on all the high roads from thence to the Ajmere District. A considerable number of people have quite lately left the country for Malwa. Prices continue as high as they ever have been in Ajmere. Wheat is selling at five seers, and barley at six seers per rupee."

But with the rain of the last week of August and the first week of September all apprehensions of famine were removed, and the rain and the cholera advanced *pari passu*. It would be of extreme interest to learn whether the same rain clouds, which from the 9th to 11th September precipitated seven inches of rain into the Peshawur valley, relieved the drought of the Caspian Provinces, and whether in Southern Russia the same meteorology ushered in the cholera of 1869. If so, this meteorology of the first week of September illustrates well what Victor Hugo meant when he wrote that the monsoon winds sweep over the Bay of Bengal to pillage the booths of Nijni Novogorod.*

Persian cholera of September and October.

I have said (p. 109 of report of last year) that I consider Persia a portion of one of our natural areas of Hindostan. What has since occurred seems to confirm this. Cholera appears by invasion in Malwa and Rajpootana in December 1868, and immediately its appearance in Persia is reported. In the first week of June cholera moves throughout Central India, and within a week Persia is visited anew.†

The cholera of Sukkur and Southern Scinde was probably carried forward simultaneously into the districts of Persia bordering on the Persian Gulf. Judging by the history of the cholera of Scinde and Northern India, I regard the Persian cholera of September as a cholera invading from without, and not a mere extension of the cholera of June, July and August. In fact, just as the cholera of June died at Umritsur on 21st September, so also in Persia decay is reported at the very same date. The Political Resident in the Persian Gulf writes on 25th September.—" Reports from the interior of Persia are to the effect, that cholera after destroying many thousands of human beings at Shiraz and Ispahan is gradually disappearing."

But along with the disappearance in the north comes the burst of the beginning of September. On 14th September the Political Resident suggests to the Persian authorities the necessity of establishing quarantine for the protection of Bushire. He writes—"The Residency Cossid, just arrived, reports that cholera prevailed all along the Shiraz road, and had approached as far as Dalikee and Borasgoon, and that in passing the latter place he heard that four deaths had occurred there that very day."

The despatches do not show the date of the outbreak at Bushire. But on 16th October we learn that the ladies and establishments had been sent away, that cholera was increasing rapidly, and that a panic was setting in. The Residency Surgeon, addressing the Resident on 15th October, says—" Nothing being done, the march of death proceeds at a rapid pace, and such is the alarm amongst the people that they are now showing signs of reluctance to bury their dead."

At this time the country around Bagdad seems also to have been entered; for a *fresh* outbreak at Divanié, a town on the Euphrates, south of Bagdad, which ceased on 5th

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* Toilers of the Sea. Original Ed. III, p. 24.

† It was estimated that up to 16th August 5,000 persons had died at Shiraz and in the neighbourhood.

January 1870, was reported by the Board of Health at Constantinople to the Foreign Office on 22nd January.

Cholera of Zanzibar—October 1869 to February 1870.

My letter regarding the epidemic relations of the cholera of Zanzibar was written on the receipt of Dr. Kirk's first despatch of 25th November. This cholera was heard of first on the continent of Africa. Dr. Kirk writes—"It is now more than a month since the first rumour reached us of the approach of cholera from the west; now it is my painful duty to record its presence among us. Two distinct centres of the disease have appeared in town, in one of which there have been three deaths, while nine have fallen in the other. It is but three days since cholera first appeared here, and there are twelve well authenticated cases already." This was Dr. Kirk's first report.

Five weeks later, on 1st January, he writes—"The mortality in town may be estimated at 9,000 or 10,000. The Arab estimate of the mortality over the island is from 25,000 to 30,000; but this I consider too high. In five weeks we have lost upwards of 12 per cent. of the population of the town. The disease is still raging in the interior of the island and along the African Coast. Northwards it makes slow progress against the strong monsoon, which set in early this year. South of Zanzibar, cholera has already passed Quilon, and all the coast villages have suffered dreadfully.

"The first epidemic of cholera in Zanzibar, of which we have any knowledge, occurred about thirty years ago. In December of 1858, and in the beginning of 1859, it returned, and carried off 7,000 or 8,000 in this town. It is said to have come along the coast from the north and to have reached as far south as Mozambique, but it did not pass to the Zambezi Provinces, where I was then stationed.

"In June and July of 1865, cholera again came down the African Coast, but did not pass Jamoo, as the south-west monsoon had set in strongly, and with the ocean current stopped all trade southwards."

On 26th January and 4th February, Dr. Kirk reports that cholera still hangs over the island, and that five men from the shipping in port have died; that it is still raging up and down the coast, and has again been reported from the interior of Africa.

What will become of this cholera it is impossible to predict; but should a cholera anywhere appear which we may conjecture to have had this African cholera for its base, it will be of extreme interest to watch its geographical connections. Europe escaped the great cholera of 1858 of the Red Sea, Aden, and Zanzibar, and it is to be hoped that the cholera of 1869 may follow this parallel; but it is worth calling to mind that the cholera of 1858 was a cholera in its fourth year of epidemic life, while the cholera of 1869 was in its second year when the invasion of Africa occurred. This much is certain, that without a definite and intimate knowledge of the cholera of every month in Hindostan we grope helplessly for a knowledge of the epidemic relations of a cholera which suddenly springs up, it may be thousand of miles away. Whether it be at the Mauritius in 1818, in Central America in 1837, the Cape de Verdes in 1856, or Gibraltar in 1860, we fail utterly to comprehend the place in epidemic history of the cholera of such outbreaks until the base and origin of each epidemic is traced in the Bengal Presidency; and it is from future history and not from the history of the past that we shall learn to appreciate what it is that is meant when we speak of the arrival of cholera in foreign lands.

The meteorology accompanying the invasion of Eastern Africa.

I have often said that no palpable manifestation realised to my mind the idea of the diffusion of the impalpable agent cholera except a locust flight. At one time leaving not a trace behind, at another dropping individuals only from the locust cloud, at a third sending down powerful offshoots, the locust flight darkening the sky overhead, traverses the widest tracts until it alights at the extremity of a natural province, because the flight has struck against the aerial wall of obstruction which I have described. It broods thick upon the terminal area over which the locusts have settled, rising and falling on the same area as meteorological influences bear upon the localised body. It sows seed to be developed when the proper season comes round and not before, and dies when the date of death arrives.

As at Simla in 1869, numerous individuals of the locust flight will be found on the tops of the highest hills, and other detached bodies can be seen as clouds of more or less density in the vallies around. But the main body from which these locusts were detached was far away—in Central India. As the cholera of May 1865 of the districts south of the Jumna suddenly projected over the Himalayas a detached body (p. 25 of last year's report), or as the cholera of Central India of the first week of June 1869 sent out its offshoot almost to the snows, so did the locust swarm of 1869 project over these hills the detachment of which I have spoken.

The particular section of the locust swarm of 1869 in which we are now interested is that which settled over the cholera area in Central India and Rajpootana. At the end of August the Lieutenant Governor, North-Western Provinces, writes—

"The flights of locusts appear to have deposited their eggs, and the larvæ are described as covering the country from Aboo to Ajmere."

At the same time the Agent for the Governor General in Rajpootana reports—

"Locusts are out over almost the entire western portion of Marwar, in Serohi, and in the country around Deesa. They are now doing little harm; but great apprehensions are entertained for the result in October when the young crops are produced."

This was the base of departure of the flight met by the *Euphrates* in the last week of October between Bombay and the African Coast. They left India with the north-east monsoon. In the first week of November the *Krishna* reported, as already quoted, that she experienced fine weather from Aden to long. 53°E., but then there was a very strong N. E. monsoon, and heavy head sea to about 68°E., and the *Euphrates* which arrived at Bombay in the same week; that while about 550 miles from Bombay, the wind N. N. E., she met an immense cloud of locusts. They were visible for about three days, great numbers of them falling on the ship and in the sea around.

Here is palpable evidence that at this date air-borne influences from Western India were being directed towards Eastern Africa, and immediately follows Dr. Kirk's report of 25th November, that about a month before, that is, towards the end of October, cholera had begun to show itself on the mainland of Africa.

Monsoon cholera of 1870 in Eastern Africa.

Delay in printing this report enables me to append the most recent intelligence regarding the cholera of Africa. That the monsoon cholera of 1870 has made its appearance in some part of Africa is evident from the correspondence which follows. This is the July cholera alluded to in my letter of 3rd February (page 205). Should Egypt escape, it will still be of the greatest interest to watch the future of this African cholera of July.

The following is an extract from a letter addressed to the Government of Bombay by the Political Resident at Aden, dated 14th July 1870:—

"There is a report that the cholera is in the Dunkelli country, and that vessels and boats from that coast are placed in quarantine at Mocha. I have made every enquiry, but cannot find that there is any disease on the coast of Dunkelli country. Vessels and boats from Aden are also made to undergo quarantine at Mocha. I trust, therefore, the report of the disease may be incorrect. The Dunkelli coast extends from south of Annesley Bay to Jajura Bay. I keep as strict a watch as I can on all boats from the African Coast."

A week later, however, the Political Agent again writes to say that he is disinclined to believe in the truth of the report, and he thinks that the rumour may have been caused by reports of cholera prevailing much further to the south. He concludes—"One term, Bir Azim, is used for the whole African Coast; hence the mistake."*

History of the cholera of the same epidemic in Assam in 1869.

I was inclined to believe that the great wave of this same epidemic progressing towards the north-east had reached the Assam Frontier and Burmah as early as June 1868. From the want of specific information and of a general registration, a positive opinion cannot even now be offered on this point. At the earliest date of revitalisation in the spring we have the district records which follow, and the facts may be indicative either of the reappearance of the cholera of 1868 or of an invasion at the end of February and the beginning of March:—

DURRUNG.—"The first case was reported on 20th February. Cholera was confined to the same neighbourhood for some days, but in March it appeared to spring up simultaneously in several divisions of Durrung all apart from each other."

NOWGONG.—"About the middle of March last, it was reported that cholera had broken out in a village about 20 miles from Nowgong. It spread through the whole of that part of the district. In the immediate vicinity of the station it has been worse than in any part of the district.*** The police have reported 2,300 deaths from cholera in the station and neighbourhood in little more than a month, and I greatly doubt whether the number of deaths is not very much underrated."

SEEBSAUGOR.—"The first appearance of cholera among the Assam Company's coolies occurred on the 27th and 28th February, but these two cases were Assamese who had just arrived from their village. In Seebsaugor itself the first case occurred on the 31st March. But reports had been received of cholera in various parts of the district for about a month before the disease made its appearance in the town."

LUCKIMPORE.—"On 2nd April, information was given by the police of deaths having occurred from cholera in three villages. It cannot be accurately ascertained when cholera first broke out in the Khowang Division, but there is evidence to show that it was early in April."

As usual when cholera is in full vigour from the Sunderbuns to Lower Assam, the steamers conveying coolies had cholera on board, and as early as February, steamers had arrived in Upper Assam in which native passengers were suffering. Such cases naturally lead to the conclusion that this importation formed the focus of the great cholera of the year. But the evidence of Mr. White, the oldest medical officer in Assam and an accurate observer, shows how little such inferences are to be trusted. He writes—

"In 1864, when the tea speculation was at its height, the numbers of laborers who arrived, amounting to upwards of 600 a month, was so great, and nearly every steamer having cholera on board, it was found impracticable, and it would have been inhuman, to prohibit their landing. I then observed that, although patients were removed actually suffering from cholera to the various factories in the neighbourhood, it was never communicated to the old coolies. So complete was this immunity from contagion that in 1866 and 1867, when acting as Debarkation Officer, I never once prohibited the removal of cholera patients from the steamer to the several tea gardens to which they were consigned. As I incurred no little responsibility in doing so, I followed up and watched the results attentively, and I never heard of an instance of any of the old laborers on the garden to which the cholera patients were taken being seized; at times some of the new party of coolies who disembarked in health would be attacked on arrival at the garden, but never any of the coolies who had been previously there.

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* The conclusion arrived at may be correct, or it may not. My experience of such reports regarding cholera is that they are almost invariably true. The very presence of cholera in the interior of the Simla Hills, and in the south of the Bhawulpore State in 1869, was denied, although the fact was afterwards authenticated. The severity of the cholera of the hills of June 1869 is attested by the enquiries of recent travellers; and the people recognise this as the only epidemic which has struck the hills beyond the Sutledge since the outbreak of the mutiny year, 1857, when these same localities suffered to an extreme degree.

"Being much interested in the matter, I from time to time in former years enquired from the medical officers of the Assam and Jorehaut Companies, the two other principal centres of immigration, and their experience was similar to mine, that cholera was never propagated by fresh arrivals to either Cinnamara or Nazirah. There have been epidemics at both those places, but they could not be traced to introduction by recently arrived coolies."*

The Commissioner of Assam says substantially the same thing—"I am very decidedly of opinion that if the importation of laborers ended to-morrow we should have as much cholera as we have now."

Mr. White, however, goes on to state that from their social and domestic habits, the Native Assamese are naturally much more liable to the attacks of cholera than the imported Bengalee laborers, and he appears to think that among them individual cases may possibly become foci. But the general population of Upper Assam is not under immediate observation, and Mr. White's idea is not consistent with the specially observed facts which he records as occurring among the Bengalee population, among whom the facts can be noted with greater accuracy.

Cholera of the same epidemic in the Berars and Hyderabad.

The registration of the Berars given in the death table for the general population shows how here, as in the Central Provinces, the cholera of 1868 renewed in power its epidemic existence in 1869. In the Berars, 10,947 cholera deaths were registered in 1869. In the Nizam's Territories, the cholera invading Hyderabad on 15th November 1868 re-appeared with the monsoon of 1869, and by the end of August 700 deaths had occurred in the city alone.

Occupation of the Chutteesghur Division of the Central Provinces.

The invasion of the Chutteesghur Division of the Central Provinces, which resulted in so great a loss of life, took place in the second week of May. In the Raipore District not a case of cholera had been reported up to this date, although in March cholera had prevailed epidemically in nine districts out of the eighteen of the Central Provinces, and in April in twelve. Sumbulpore, Bhundara, Balaghat, and Raipore remained unoccupied, and Belaspore alone of the exempted tract of 1868 got cholera in March and April. This is not to be forgotten in trying to ascertain under what conditions invasion occurred.

On the 12th May the explosion took place, and in this week 34 villages were attacked in the Raipore District. It is necessary to look abroad to see whether any general choleraic influence prevailed about this time, along with which invasion may have occurred. Without direct proof of importation we are not warranted in assuming that importation took place indirectly, that is, without even the fact of the arrival of men suffering from cholera, or who subsequently suffered from cholera, having been recognised. We should not overlook that in the city of Banda the death register begins on the 10th May; that on the evening of the 11th the great outbreak of the 7th Fusiliers began at Saugor; that in the city of Saugor, where in the after months of the year 561 lives were lost, two cases of cholera only, and these not fatal, occurred before the 9th May; that in Dumoh, the first death was recorded on 13th May; or that in the town of Mundla it was on the 9th May that the first man died. All of these cases are indices of a certain value in weighing the evidence for and against direct importation by human agency.

At page 139 of my previous report, I pointed out how fifty years ago the Kurnaul Cantonment was struck on the 11th May; and I showed that the fact of forty villages of the Delhi District having become affected on this same day in 1867 was a fact strictly parallel in epidemic history. And so also is this epidemic invasion of the Raipore District. Although the Civil Surgeon evidently has no conception of epidemic diffusion beyond that by human intercourse, the simple fact which he states, that on the 12th May cholera became generally epidemic, is not the less valuable. I have no difficulty in recognising the perfect parallelism of these facts of 1820, 1867, and 1869, although the illustrations are so widely separated in time, and occurred in localities lying widely apart.

In this week the breaking up of the great and persistent heat appears to have occurred. The district reports are as follows:—

District Reports, Central Provinces, 9th to 15th May.

BELASPORE.—Weather unusually sultry and clouds about.
SUMBULPORE.—Rain again threatening.
RAIPORE.—No return.

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* In the face of this deliberate statement made by Mr. White, we find in the same collection of documents a Report by the Protector of Laborers, in which he suggests that the cholera of 1869 spread from various tea gardens of Upper Assam after its introduction by Bengalee laborers in February and March.

NIMAR.—Slight shower on evening of 9th.
NURSINGPORE.—Evening cloudy, with a few drops of rain.
HOSHUNGABAD.—A few drops of rain fell.
BAITOOL.—Weather cloudy.
MUNDLA.—No return.
SEONEE. There has been a slight shower of rain.
WURDAH.—The weather has been cloudy every morning.
BHUNDARA.—Sky cloudy.

In the reports from Nagpore, Chanda, Jubbulpore, Saugor and Dumoh mention is not made of the state of the atmosphere. At page 105 of the report of last year, I have stated that I consider the cholera of the Central Provinces nearly allied in its meteorological relations to the cholera of the endemic area, which finds its maximum in the months which are the hottest. There does not, however, exist in these provinces, as in the endemic area, the condition which entails extinction during the monsoon, and hence in this situation the monsoon cholera is as powerful or more powerful than the cholera of the spring.

Dates of decay of the great cholera of the Central Provinces.

The dates of the decay of the cholera of the Central Provinces may be gathered from the following statements from the different districts. The parallel statement for 1868 is given at page 155 of last year's report.

Weekly reports from the different Districts of the Central Provinces, indicating the decay and dying out of the Cholera of 1869.

September 18th, *Chanda.*—Cholera has almost disappeared.
,, *Wurdah.*—Cholera almost disappeared.
,, *Saugor.*—Cholera on the decline.
,, *Baitool.*—Cholera has again shown itself.
,, *Chindwarra.*—Cholera reported, but the type seems mild.
,, *Nimar.*—Twelve cases of cholera and three deaths reported.
,, *Sumbulpore.*—Cholera decreasing.
,, *Belaspore.*—Cholera still in the Saragaon Circle, but abating.
September 25th, *Wurdah.*—No fresh cases of cholera since 10th instant.
,, *Saugor.*—There is still a little cholera.
,, *Baitool.*—Cholera has again disappeared as suddenly as it came.
,, *Chindwarra.*—Cholera has almost disappeared.
,, *Nimar.*—Four cases of cholera reported during the week.
,, *Sumbulpore.*—Cholera fast disappearing.
,, *Belaspore.*—Cholera still hanging about the eastern portion of the district.
October 2nd, *Wurdah.*—No cholera.
,, *Saugor.*—Only a little cholera.
,, *Baitool.*—Cholera still occurs at times.
,, *Nimar.*—No cholera cases reported.
,, *Sumbulpore.*—Cholera has almost disappeared.
,, *Belaspore.*—Cholera has disappeared.

In the week ending 9th October there are only two notices of cholera. It is noted that there is still cholera in the Baitool District, and that choleraic diarrhœa has appeared in a pergunnah of the Balaghat District.

No mention of cholera in any district is made in the report for the week ending 16th October.

In these same weeks from the 18th September to the 8th October, when the monsoon broke up, rain was persistent and universal. Had the cholera of the season been developing, in place of falling naturally into decay, such a meteorology would have been favourable to the highest degree of manifestation. But there is no lengthening out of the reproduction manifested out of sympathy for this favourable meteorology; decay and death occur because the season for decay has come round, as we have seen the appearance to occur because the season for re-appearance has come round. In every district of these same provinces fever prevailed during these same weeks, owing to the prevalence of the meteorology favourable for its appearance. But the same influences had no effect in reviving or prolonging the cholera of the same tract.

Cholera of November of Peshawur, Kohat, Bunnoo and Meerut, and the disappearance of the cholera of 1869.

The Kohat valley was invaded on 29th September, and the last case occurred, as in the Peshawur valley, in the first week of November. The loss of the troops in this invasion will be considered in speaking of the aspects of outbreaks in the last section. Cholera did not appear in the Bunnoo District before this same week in November. In all, 124 of the inhabitants were carried off, and 10 men only were lost out of a garrison of 1,650.

Within the monsoon area, so late as the 8th November, a woman of the 4th Hussars was attacked at Meerut.

General characteristics of the year and the aspects of disease generally in relation to these characteristics. The alliances of the epidemic malaria with the cholera of 1869.

The general features of the year 1868 I have sketched at page 150 of my previous report, and the characteristics of years of a similar constitution were treated of at page 69. In this year I have to show the opposite side of the picture, namely, the characteristics of an epidemic year in Northern India.

It must not be assumed that in speaking of the aërial relations of malaria and cholera, I am speaking of one and the same phenomenon, and that where cholera is conveyed there and then also is malaria conveyed. I restrict myself to the statement, that the motions of the air favourable to the manifestations of malarious influences may prove the vehicle of the cholera miasm. There was no special manifestation of malaria with the great movement of cholera in the first week of June; the monsoon cholera of Oude, Cawnpore, and Allahabad was not accompanied by any outburst of malarious fever, nor did a single case of cholera accompany or follow the great fever of Meean Meer and Rawul Pindee; and the great cholera of the Central Provinces was dead when late in the year the population were dying from fever by the thousand. Rohilcund and Meerut was as regards both cholera and malaria an exempted province in 1869; the stations of the Gangetic Provinces and Oude suffered universally from cholera, and were, with the exception of Allahabad, nearly free from the epidemic of malaria. In short, I wish to be understood that the natural history of cholera is to be studied as the natural history of an individuality; and that the epidemic phenomena of the two miasms are not of such a nature that their manifestation must necessarily be shown side by side.

The natural provinces of cholera are the natural provinces of malaria, because the geographical limits of natural provinces are defined by recurring aërial phenomena precise as regards their limitation and space. It may be too that malaria is as much an individuality as the cholera miasm. This much is certain, that its distribution in any year is distinctly provincial; and I am inclined to believe that something beyond the mere peculiarity of the distribution of the rainfall of the season in any province is required to determine a minimum or maximum of the development of fever from August to November. That rains lasting up to the first week of October foster fever, there can be no doubt, and the cold of the nights in Northern India in November maintains the fever in power for yet a month later. But in such cases as that of the epidemic malaria of 1869, there will, I think, generally be found, early in the monsoon, the evidence of the existence of something over and above the mere climatic phenomena of the season.

Universality of the development of malaria throughout the Punjab in the second week of August.

It matters not which type of the population we select to show that in a certain week malarious fever became universally developed over Central and Northern India. I have placed here a table showing the admissions from fever among the native troops; and this tells us that from Roorkee to the Peshawur Frontier one common influence prevailed in the week ending the 13th August, which in every station of the area caused the development of fever among the inhabitants; that from this week up to the middle of November this influence continued in force, and that it reached its maximum in the month of October.

The extreme suddenness of the appearance of this fever is worthy of notice. Mr. Eteson, of Roorkee, quoting from his diary, says, that, on going to hospital on the morning of the 12th August, he found that during the night an epidemic had appeared and that many men had been struck down, and the fever was general throughout the station on the same day.

Punjab, Native Troops. Statement showing the commencement and progress of the Epidemic Malaria of 1869.

STATION.	Strength of July.	FEVER ADMISSIONS, MALARIOUS SEASON OF 1869.										Fever rate for the year per cent of strength
		July.	Week of August ending				August.	September.	October.	November.	December.	
			6th.	13th.	20th.	27th.						
Bannoo ..	1,648	50	9	33	80	45	213	580	926	964	394	201·62
Kohat ..	2,285	94	20	141	268	169	695	1,243	1,092	563	250	171·09
Peshawur ...	3,245	327	60	124	317	201	1,019	1,279	1,811	1,135	307	193·10
Murdan .	840	25	9	17	11	19	76	74	210	163	33	78·65
Nowshera ...	1,013	46	14	35	62	29	168	215	407	325	111	132·72
Abbottabad .	1,263	83	27	54	93	110	353	538	703	427	135	175·16
Attock . .	172	2		4	8	6	24	70	119	117	31	239·77
Rawul Pindee	1,152	44	6	21	35	20	112	221	350	204	47	97·71
Jhelum .	1,555	43	15	41	35	39	153	156	473	419	110	94·75
Sealkote .	921	30	3	7	10	6	31	38	72	103	22	43·01
Dhurmsala .	480	42	13	28	33	17	104	137	131	59	25	106·87
Bukloh	604	37	7	14	10	8	49	70	37	28	6	45·82
Meean Meer ...	1,263	28	9	19	71	75	210	277	869	750	219	201·65
Umritsur .. .	152	2	2	2	4	2	10	26	57	21	9	91·28
Mooltan . ..	919	34	2	3	45	35	115	103	278	100	68	100·53
Ferozepore	585	14	6	8	13	16	52	49	134	33	7	59·93
Jullundur	373	28	1	5	14	18	49	105	115	113	4	108·82
Loodianah	90	2	...	5	11	7	37	26	78	26	...	214·04
Phillour	82	17	2	2	11	16	37	55	8	10	5	150·04 (six months.)
Umballa	852	34	4	6	7	12	38	36	94	73	13	45·24
Delhi .. .	697	9	1	5	31	29	83	94	180	177	40	118·07
Roorkee ..	194	8	2	18	31	8	72	120	117	50	9	107·93
	20,389	999	218	582	1,201	878	3,716	5,514	7,974	5,959	1,959	... ..

Fever of 1869 universal from Allahabad to Kurrachee.

Throughout Central India universally this great epidemic of malaria extended. Here I do not trace its existence in strength until the second week in September; and, as at Allahabad, in some places the invasion did not occur until October at the date at which the monsoon rains, which lasted up to 10th October, began to dry up. As in Northern India, the fever epidemic of the Central Provinces reached its climax in October and November, and its geographical spread was as wide as that of the cholera of 1869, namely, from the Jumna to Scinde; the fever of the 58th at Allahabad of October and November was the same fever from which the Fusiliers at Kurrachee were suffering at the same time, and between these points the geographical continuity of the fever wave was unbroken.

The distribution of this fever was distinctly provincial. Statements illustrating the geography of the epidemic, and giving the ratios for a non-epidemic year in contrast to those of 1869.

Meerut and Rohilcund, which I have described as a natural province, and lying out of the line of influences proceeding from south-east to north-west, escaped this great fever of the south and west, just as it escaped the cholera of 1869; Roorkee towards the hills and Delhi on the extreme west of the province alone suffered.

With the exception of Allahabad, no station of the east suffered to any extent from the epidemic malaria, and Oude absolutely escaped. In the statement which follows, the maintenance of the numbers affected up to November indicates the presence of fever in Allahabad, and the very slight affection of a few other stations. But for the province, as a whole, the statement is a striking one, showing, as it does, how entirely provincial was the aspect of the malaria of the year. It should be read in contrast to the two statements which come after.

1869, *a non-malarious year in Oude and the Valley of the Ganges.*

EUROPEAN TROOPS, GANGETIC PROVINCES AND OUDE, 1869. STRENGTH 8,308.

	Fever Admissions.		Ratio per cent of Strength.
January ...	57	Spring months	5·85
February...	74		
March ...	152		
April	223		
May ...	241	Hot months ...	11·55
June	521		
July ...	234		
August ...	348	Malarious months ...	17·20
September	322		
October ...	352		
November	360		
December	115	....	1·63
	2,999		36·23

A ratio of 17 per cent. against a ratio of 71 indicates the comparative escape of the Gangetic Provinces, and the intensity of fever in Central India and the Punjab.

As both provinces in the west were affected alike in 1869, so in 1868 both formed part of one non-epidemic tract, and no illustration of the parallelism of the results in epidemic and non-epidemic years could be more beautiful than that here exhibited:—

The non-epidemic year 1868 and the epidemic year 1869 in Central India and the Punjab contrasted by the fever ratios of the European Troops.

PUNJAB.

STRENGTH OF 1868, 12,570; OF 1869, 13,998.

	Fever Admissions.			Ratio per cent. of strength.	
	1868.	1869.		1868.	1869.
January ...	364	219	Spring months ...	10·08	7·43
February ...	192	181			
March ..	250	234			
April ..	367	390			
May ...	931	1,175	Hot months ...	22·73	21·85
June ..	1,357	1,068			
July ...	723	970			
August ...	795	1,723	Malarious months	22·55	71·11
September ...	763	1,910			
October ...	693	2,023			
November ...	694	3,152			
December ...	605	1,355	....	4·91	10·11
Total ...	7,737	15,543	... ...	60·27	110·86

AGRA AND CENTRAL INDIA.

STRENGTH OF 1868, 4,170; OF 1869, 4,374.

	Fever Admissions.			Ratio per cent of strength.	
	1868.	1869.		1868.	1869.
January ...	181	107	Spring months ...	12·81	9·91
February ...	114	73			
March ...	105	118			
April ...	134	164			
May ...	167	161	Hot months ...	16·60	13·50
June ...	271	291			
July ...	261	144			
August ...	211	372	Malarious months	20·79	70·77
September ..	270	531			
October ...	200	1,009			
November ...	170	1,107			
December ...	142	334	....	3·25	9·72
Total ...	2,226	4,414	....	53·45	103·90

Rainfall of the monsoon season in the different districts of Central and Upper India, and the natural arrangement of areas in relation to the amount of rain which they receive.

It is very interesting to trace the effects of the monsoon in determining the rainfall of different parts of Upper India between June and the first week of October. The Statement annexed shows the rainfall of districts in 1869.

The districts of Western India lying east of the Western Ghâts seem to have received not one-half of the rainfall of the Central Provinces. Even the stations of Khandeish had in 1869 a rainfall little over 20 inches. But leaving the western coast the rainfall increases; Nimar shows from 30 to 33 inches, Hoshungabad 42, and Nursingpore 47. Baitool gives 29 inches, and Nagpore 35. All of these districts have the western coast as the base of their rain system; and it is curious to observe that in proportion as they are distant from this base, so much the greater does the fall become. This is a very important observation in relation to the passage of cholera from north-east to south-west, of which I have spoken at page 178 of this report. If in an epidemic season like 1869 direct influences from the south-west show themselves so weak, it is not to be wondered at that in a year like 1868, when they died away almost entirely, influences from the north-east should step in to fill the vacancy in the manner I have there described. The greater rainfall of the north-eastern districts of the province of the south-west monsoon proper, I consider to be owing to the rain from the western coast meeting the line of the influences from the Bay of Bengal, and falling after striking upon this aërial wall. The line of this wall is beautifully marked in the cholera map for 1867, when it formed the line of separation between the epidemic and non-invaded areas of that year.*

The districts in the centre of the peninsula show throughout a rainfall of 50 inches, which is 10 inches in excess of the rainfall of the Gangetic Provinces. From Banda to the Behar Provinces the rainfall varies from 35 to 43 inches, and the average between these extremes holds good for nearly all stations of the great natural province, until we approach the western margin, the line of 80°. Here Cawnpore and Futtehghur give each 31 inches, and the western districts of Oude from 20 to 23 only.

In the natural province lying west of 80°, the great consistency of the rainfall is well seen. In the north, probably from its proximity to the hills and the frequency with which eastern influences extend so far, Bareilly gives 39 inches,—an exceptional rainfall. In the south, Etawah falls in with the districts lying south of the Jumna and gives a rainfall of 36, and Mynpoorie bordering on Etawah gives 32. With these exceptions, the rainfall of the eastern districts of this province is 25, and of the western 17 to 19 inches.

The latter rainfall holds good for the region around Delhi, and it gradually dies off towards the desert, although even here the fall is that of an exceptional year, notably in the Montgomery District, which gives 24 inches.† The districts of the east of the Punjab west of Umballa, and all the districts under the hills as far as Huzara, show a rainfall of from 25 to 30 inches. But in the Punjab, from Lahore to the Frontier, the effect of the cessation of monsoon influences is at once perceived, and the rainfall is the same as is seen in the districts bordering on the north-western desert. The fall on the Frontier of the 9th, 10th and 11th September was an exceptional occurrence, such as is recorded only at long intervals.

Monsoon Rains of 1869, 1st June to 10th October.

RAINFALL OF DISTRICTS IN INCHES.

Districts of Western India.		Districts to the east and north of the preceding.		Districts of the Gangetic Valley and Oude.	
Poona ...	.. 19·3	Raipore ...	... 64·8	Chyebassa ...	... 46·2
Ahmednuggur ...	.. 26·0	Belaspore ...	. 50·3	Hazareebaugh	... 41·2
Nassick ...	... 22·4	Seonee .	... 55·3	Gyah ..	41·8
Malligaum ..	... 22·8	Mundla ..	59·6	Patna . .	... 43·0
Dhoolia ...	... 20·8	Chindwarra ..	... 50·6	Ghazeepore ...	... 39·0
Asseerghur ..	... 30·5	Jubbulpore ..	.. 62·1	Benares	... 38·4
Khundwa ...	... 32·7	Dumoh ..	... 50·0	Allahabad ...	... 45·3
Baitool ..	... 29·0	Saugor ..	.. 51·3	Futtehpore ...	... 39·8
Wurdah ...	... 28·6	Lullutpore ...	... 49·2	Humeerpore ..	... 38·2
Chanda ...	... 43·2	Jhansi ...	... 59·9	Banda ...	... 35·4
Hingunghat ..	... 38·2			Oraie ...	.. 29·2
Nagpore ...	... 35·4			Cawnpore ...	... 31·6
Bhundara ..	... 45·5			Futtehghur .	... 31·6
Nursingpore ...	... 47·1			Goruckpore ...	... 40·6
Hoshungabad ...	... 42·3			Fyzabad ...	... 46·7
				Baraich ...	... 32·7
				Rae Bareilly ...	... 34·6
				Lucknow ...	... 35·6
				Oonao ...	... 37·7
				Seetapore ...	... 22·7
				Hurdui ...	... 20·0
				Kheree ...	... 23·3

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* It is very instructive to note how the western limiting line of the cholera of 1868 and the southern limiting line of the cholera of 1867 cross each other at an angle. The line of 1867, stretching from south-east to north-west, extends straight from Chota Nagpore to Caubul, while the line of 1868, directed from north-east to south-west, curves round from Northern Oude to Malwa. Such facts in geography, even when standing alone, teach that it is by aërial agencies that limits are so defined.

† Contrast with this the rainfall of the same districts in 1868, p. 150.

Districts west of 80° E. Long.		Districts of the Punjab.			
Etawah ...	... 35·7	Goorgaon ...	... 18·4	Goordaspore ...	... 26·2
Mynpoorie ...	... 31·8	Delhi ...	... 21·7	Sealkote ...	... 34·0
Agra ...	... 26·7	Kurnaul ...	... 15·2	Goojranwalla ...	... 22·5
Shahjehanpore ...	... 25·9	Umballa ...	... 20·7	Huzara ...	... 23·5
Bareilly ...	... 39 0	Rohtuck ...	... 18·3	Umritsur ...	... 20·1
Bijnore ...	... 26·8	Hissar ...	... 9·4	Lahore ...	... 11·8
Moradabad ...	... 25·0	Sirsa ...	... 10·7	Jhung ...	... 9·2
Budaon ...	... 25·5	Mooltan ...	... 8·3	Shahpore ...	... 10·9
Etah	... 24·5	Mozufferghur ...	... 5·5	Jhelum ...	.. 11·3
Muttra ...	... 19·4			Rawul Pindee ...	... 14·0
Allyghur ...	... 22·7			Peshawur ...	... *8·5
Bolundshuhur ...	... 19·3	Loodianah ...	... 30·4	Kohat ...	... 12·8
Meerut ...	... 16·4	Jullundur ...	... 29·7	Bunnoo ...	... 6·4
Mozuffernuggur ...	... 17 9	Ferozepore ...	... 25·3	Dera Ismael Khan	... 6 3
Seharunpore ...	... 16·9	Montgomery ...	... 23·8	Dera Ghazee Khan	... 9·9
		Hoshiarpore ...	... 23·7	Rajanpore ...	... 7·2

The Table showing the rainfall over the different districts of the monsoon area on each day from the 1st June to 10th October, is placed here to teach, how, although differing in degree in different parts, the general influence is one and the same, and how local peculiarities are of secondary importance in comparison with that subjection to general agencies which is common to every portion of the monsoon area:—

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* Seven inches between 9th and 11th September.

PART III.

THE ASPECTS OF THE CHOLERA OF 1869 AS SHOWN IN THE AFFECTION OF COMMUNITIES.

I have in the previous section spoken of the cholera of 1869 as all-pervading within an area covered, as shown sometimes in shadow, sometimes in substance, as having substantial geographical limits, and as influenced in its manifestation by the prevailing meteorology and by what cholera is in itself when viewed as an object of natural history. Whether the included population be taken as a whole, or whether a type only be selected for illustration, the general phenomena of the epidemic are identical, because the same general laws control cholera in its relations to a body of men which come into operation in determining the manifestations within an area of any extent which has been covered by cholera.

Any type repeats what is taught by the phenomena shown over the entire area covered, or in any part of it.

While I have been speaking of the cholera of Central and Upper India, and showing how within each portion of the monsoon area cholera has behaved at different dates, our proper indices have taken up the same story and repeat it to us. When cholera ceases as in the interval between the spring and monsoon, it ceases also in our types from one end of the Presidency to the other; when an area is suddenly invaded, our types are as suddenly and generally struck; and when cholera dies in any area, it dies among our types.

The general aspect of the monsoon cholera of 1869 as exhibited among the European Regiments cantoned within the monsoon area.

The table which follows shows beautifully what I have described as occurring within the monsoon area in 1869. In this table is shown every admission from cholera among the men, women, and children of the European Army throughout the monsoon area from Dinapore to Umritsur. It begins on 1st July, and shows a blank up to the 12th, and but one case appeared in the whole army between the 1st and 17th. Next follows the universal culmination in August, and then the disappearance before the end of September, except at Meerut and Morar, where six cases were carried into October. This table almost exactly reproduces the relations of the cholera of 1856, 1860, 1861, and 1862, as given at pages 169—173 of the report of last year. And selecting Morar as a typical station, the monsoon cholera of 1869 takes its place precisely as an addition to the table at page 174, which shows the cholera of Morar in 1860, 1861, 1862, 1865, and 1867.

Monsoon Area. Cholera Admissions of each day. European Regiments—Men, Women, and Children.

Date of Admission.	Stations of the Monsoon Area from Dinapore to Umritsur.																
	Dinapore, Strength 1,065.	Benares, Strength 908.	Fyzabad, Strength 1,257.	Lucknow, Strength 3,107.	Cawnpore, Strength 1,310.	Allahabad, Strength 1,141.	Morar, Strength 1,071.	Gwalior Citadel, Strength 278.	Seepree, Strength 157.	Jhansi, Strength 789.	Nowgong, Strength 221.	Saugor, Strength 1,672.	Jubbulpore, Strength 808.	Subathoo, Strength 1,010.	Jullundur, Strength 1,022.	Ferozepore, Strength 1,145	Umritsur, Strength 125.
July 1st to 12th ...	None.	None.	None.	None.	None.	None.	None.	None.	None.	None.	None.	None.	None.	None.	None.	None.	None.
,, 13th ...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...
,, 14th ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, 15th ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, 16th ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, 17th ...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...
,, 18th ...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...
,, 19th ...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...
,, 20th ...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...
,, 21st ...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...
,, 22nd ...	...	1	...	...	1	3	...	...	...	...	...	...	...	...	...	...	...
,, 23rd ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, 24th ...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...
,, 25th ...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...
,, 26th ...	1	1	...	...	4	...	...	...	...	...	...	...	...	...	...	...	...
,, 27th ...	...	...	...	...	1	2	...	...	...	...	...	...	...	...	...	...	...
,, 28th ...	...	...	...	1	...	2	...	...	...	...	...	3	...	...	...	...	...
,, 29th ...	...	...	...	1	1	...	...	...	1	...	...	...	...	...	...	...	...
,, 30th ...	...	...	...	3	1	1	...	...	...	...	...	1	...	...	...	...	...
,, 31st ...	...	...	...	7	2	1	...	...	1	...	...	1	...	...	...	...	...
August 1st ...	...	...	...	...	...	1	1	...	...	...	...	6	...	...	...	...	...
,, 2nd ...	...	...	...	7	...	...	...	...	1	...	1	1	...	...	...	...	...
,, 3rd ...	...	...	...	10	...	2	1	...	...	...	...	2	...	...	...	...	...
,, 4th ...	...	...	...	9	...	3	6	1	...	...	...	1	...	...	...	...	...
,, 5th ...	...	...	...	8	...	5	...	...	...	...	...	2	1	1	...	...	...
,, 6th ...	...	...	1	6	1	5	3	...	...	...	...	2	...	...	...	...	1
,, 7th ...	...	...	...	9	2	7	2	1	1	2	...	4	...	1	...	...	...
,, 8th ...	...	...	4	8	1	5	...	...	...	3	...	2	...	1	...	...	...
,, 9th ...	...	...	2	6	...	1	8	...	...	5	...	1	...	1	...	...	1
,, 10th ...	...	1	4	4	...	4	1	1	...	1	...	...	...	...	...	...	...
,, 11th ...	...	...	3	4	1	...	2	...	...	4	...	...	...	...	...	...	...
,, 12th ...	...	...	2	8	...	2	5	...	...	1	...	2	...	1	...	...	2
,, 13th ...	...	...	3	6	1	2	5	...	...	...	...	1	...	...	...	...	1
,, 14th ...	...	...	...	7	3	3	1	...	...	3	...	1	...	3	...	...	...
,, 15th ...	1	...	1	3	2	...	1	...	...	9	...	2	1	...	...	...	...
,, 16th ...	...	...	...	3	...	...	4	...	...	6	1	...	...	...	...	...	...
,, 17th ...	...	...	...	1	...	1	7	...	...	3	...	2	2	...	...	1	...
,, 18th ...	...	...	2	1	...	...	10	...	...	1	...	...	...	...	...	...	...
,, 19th ...	...	...	...	2	...	...	...	...	...	4	1	2	...	...	...	...	...
,, 20th ...	...	...	...	1	...	...	2	...	...	1	...	1	...	...	...	...	1
,, 21st ...	...	...	...	1	...	...	3	...	...	2	1	...	...	...	...	...	...
,, 22nd ...	...	...	...	2	...	...	2	...	...	2	...	...	...	...	...	...	...
,, 23rd ...	...	...	...	2	...	1	3	...	...	...	...	2	...	...	1	...	...
,, 24th ...	...	...	...	3	...	...	1	...	...	...	...	...	...	...	...	...	...
,, 25th ...	...	...	1	1	...	...	...	...	...	1	...	...	...	...	...	...	...
,, 26th ...	...	...	...	...	1	...	4	...	...	2	...	...	...	...	...	...	...
,, 27th ...	...	...	...	2	...	...	1	...	...	1	1	...	...	2	...	...	...
,, 28th ...	...	...	1	1	...	...	3	...	...	...	...	1	...	4	...	...	...
,, 29th ...	...	1	...	1	...	...	3	...	...	...	...	1	...	...	...	...	...
,, 30th ...	...	...	...	...	...	...	1	...	...	...	...	...	...	2	...	...	...
,, 31st ...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
September 1st ...	...	...	...	...	...	...	...	...	...	2	...	2	...	3	...	...	...
,, 2nd ...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
,, 3rd ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, 4th ...	...	...	1	...	...	...	...	...	...	...	...	...	...	5	...	...	...
,, 5th ...	...	...	...	...	...	...	1	...	...	...	1	...	...	1	...	...	...
,, 6th ...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
,, 7th ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, 8th ...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, 9th ...	...	...	2	1	...	...	...	...	...	2	...	...	...	...	...	...	...
,, 10th ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, 11th ...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
,, 12th ...	...	...	...	...	...	...	2	...	...	1	...	...	...	...	...	...	...
,, 13th ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, 14th ...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
,, 15th ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, 16th ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
,, 17th ...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...

Morar had four admissions after this date on 23rd and 29th September, and 3rd and 14th October. At Meerut, as at Peshawur, the cholera of the same movement originated an outbreak in which 19 admissions occurred. It began on 6th September, and between this date and 28th, 14 cases appeared; there were 4 cases in October, and one in November.

Beyond the monsoon area, the parallels of 1858 and 1862 held good, and the anticipation formed in the first week of September, that in the Peshawur valley the invading cholera would not become extinct until the first week of November, was exactly realised.

All statements made by local observers regarding the introduction of cholera by human intercourse are of no permanent value until reviewed in relation to the general epidemic phenomena of the year.

After the general history of the epidemic which I have sketched, it is scarcely necessary to add that this cholera followed no lines of human communication, or that lines of human communication were powerless to modify its geography.

All statements made by local observers, which give a narrative of the introduction of cholera into their districts by means of human intercourse, must be reviewed in relation to the general aspects of cholera during the year. In the epidemic of 1869, the attempts to connect the cholera of districts or communities with imported contagion have been few, and most observers here contented themselves with simply stating that the evidence of introduction is wanting. With these statements the Sanitary Commissioner will deal, as well as those which would connect the localisation of the cholera of the year with a cholera-poisoned water-supply.

Illustrations from the cholera history of 1869 of outbreaks which conform to the shape indicated as typical in the previous report.

The importance of recognising the standard typical for the cholera outbreak does not seem to me to be sufficiently apprehended. And yet it is by this standard that the effect of practical measures, as well as the significance of many points on which a clear understanding is essential before the history of a local or general outbreak can be accurately written, must be determined.* The following are illustrations which conform more or less in shape to what I have described as the type of the outbreak (p. 180) :—

Outbreaks of 1869 *conforming more or less closely to the typical standard.*
ADMISSIONS OF EACH DAY OF THE OUTBREAK.

Her Majesty's 36th Regiment, Peshawur. †			Her Majesty's 104th Regiment, Peshawur. †			Native Troops, Peshawur. Strength 3,244.			Native Troops, Kohat. Strength 2,200. (Deaths.)			Her Majesty's 7th Fusiliers, Saugor. †			Her Majesty's 62nd Regiment, Lucknow. †		
Sept.	8	0	Sept.	8	0	Sept.	8	1	Oct.	1	0	May	12	2	July	29	1
,,	9	0	,,	9	0	,,	9	0	,,	2	0	,,	13	1	,,	30	3
,,	10	0	,,	10	0	,,	10	0	,,	3	0	,,	14	0	,,	31	6
,,	11	1	,,	11	2	,,	11	4	,,	4	1	,,	15	0	August	1	0
,,	12	0	,,	12	3	,,	12	4	,,	5	2	,,	16	13	,,	2	7
,,	13	1	,,	13	1	,,	13	3	,,	6	9	,,	17	6	,,	3	10
,,	14	0	,,	14	1	,,	14	1	,,	7	9	,,	18	4	,,	4	9
,,	15	2	,,	15	2	,,	15	1	,,	8	21	,,	19	1	,,	5	8
,,	16	0	,,	16	1	,,	16	2	,,	9	18	,,	20	1	,,	6	6
,,	17	1	,,	17	3	,,	17	2	,,	10	10	,,	21	0	,,	7	5
,,	18	29	,,	18	23	,,	18	8	,,	11	13	,,	22	1	,,	8	2
,,	19	34	,,	19	31	,,	19	25	,,	12	7				,,	9	1
,,	20	21	,,	20	9	,,	20	9	,,	13	10				*	*	*
,,	21	9	,,	21	4	,,	21	22	,,	14	7				August	10	1
,,	22	22	,,	22	2	,,	22	8	,,	15	4				,,	11	3
,,	23	6	,,	23	5	,,	23	13	,,	16	2				,,	12	2
,,	24	12	,,	24	1	,,	24	18	,,	17	2				,,	13	2
,,	25	36‡	,,	25	1	,,	25	15	,,	18	1				,,	14	4
,,	26	11	,,	26	6	,,	26	8	,,	19	2				,,	15	1
,,	27	1	,,	27	0	,,	27	4	,,	20	2				*	*	*
,,	28	1	,,	28	1	,,	28	1	,,	21	1				August	27	2
,,	29	0	,,	29	1	,,	29	10	,,	22	4				,,	28	1
,,	30	2	,,	30	1	,,	30	2	,,	23	5						
Oct.	1	1	Oct.	1	1	Oct.	1	6	,,	24	1						
*	*	*	*	*	*	,,	2	9	,,	25	0						
Oct.	13	5	Oct.	4	1	,,	3	0	,,	26	0						
,,	14	6	*	*	*	,,	4	1	,,	27	1						
*	*	*	Oct.	7	1	,,	5	0	,,	28	0						
Oct.	20	1	*	*	*	,,	6	1	,,	29	2						
	......		Oct.	23	1		......		,,	30	1						
						A few cases at intervals up to 9th November.			,,	31	0						
									Nov.	1	1						

All phenomena connected with the manifestations in communities are subordinate to the laws which control the manifestations over areas.

Such a table as this, and indeed the history of all outbreaks in communities, must be read with reference to the statistics showing the persistence of cholera throughout the period for which it is vitally manifested. Various successive outbreaks, as well as individual cases, may show themselves at any time between the date of manifestation and decay. A notable example of this in 1869 was the cholera of Her Majesty's 58th Regiment, which beginning on 22nd March ended on 14th August. During this time four distinct outbreaks occurred. This case singularly repeats the history of the 70th Regiment in 1853, as given at page 203, with the exception that the outbreak of the earlier spring months was superadded in the case of the 58th.

The phenomena of movement and quiescence I have illustrated in various parts of the previous sections; the two tables at pages 200 and 216 show the decay of the spring cholera and the commencement of the monsoon cholera of the year to be a phenomenon of general significance; and the winding up of the cholera of this year, as of all others, has been shown to be a pheromenon depending essentially on what cholera is in itself, and bearing no essential relation to conditions of communities, which might be theoretically regarded as adapted for the prolongation of epidemic vigour.

The cases of the population of the cities of Umritsur and Peshawur taken in contrast, show how cholera may gradually develop in a locality after its original dissemination, or may appear in its utmost strength in a very few days after its precipitation.

In this year the distinction between the localisation and gradual growth of cholera and the sudden descent of cholera in strength upon a locality is illustrated by the cases of Umritsur and the Peshawur valley. On 27th May the first case of cholera was recognised at Umritsur; in all the month of June there were but 38 deaths in the city; in the early part of July the number of casualties was small; and then when the monsoon cholera appeared everywhere else in strength, it appeared here also, certainly not by invasion, and on 16th July there was a sudden increase to 27 deaths. The great cholera then went on and culminated on the 16th August, when 118 persons died; it was at an end on 6th September, and by this date 3,026 persons had died in the city alone.

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* The application of the test of conformity to the typical standard in the case of the Hurdwar cholera of 1867 is made at page 192.

† Men, women, and children.

‡ With 11 exceptions, these were re-admissions, not fresh cases.

The full manifestation of this localised cholera of Umritsur was thus delayed for seven weeks. The aspect of the Peshawur cholera was entirely different. The first case of cholera recognised in Peshawur city was on 1st September, and on the 7th it began to make way, and on the 13th 92 persons died.

The sprouting of the seed sown on a certain day. Parallel of 1867 and 1869 in the Peshawur valley.

On the 11th September the area of the Peshawur valley occupied by the cantonment was visibly affected, and suddenly on the 18th every corps in cantonment and in camp was struck by cholera. The General Commanding reports,—"It burst as a storm over the station." I have shown how in Scinde, far to the south, the cholera of the same invasion culminated on the very same day. This is, I think, an instance of what I have described under the figure of the sprouting of the cholera seed, and a parallel to what occurred in the Peshawur valley in the first week of June 1867, following the invasion of 19th May. The cholera of the invasion of the 19th May 1867 descended in force on the city and cantonment and was reproduced in power in the first week of June; in 1869 cholera descended upon the valley in the first week of September, and, after the same interval as in 1867, there came the sudden and universal onset of the 18th.

Value of the lesson taught by this parallel, as showing that there may be an interval during which escape from the localised cholera is possible.

I pointed out (p. 181) how in 1867 the aspects of the outbreak of the 42nd Highlanders and that of the 77th Regiment were quite distinct, and that the distinction was owing to the fact that the Highlanders, terribly as they suffered in the first days, had no second attack due to the coming forward of the cholera of the first week of June, because by removal to Cherat they were placed at an elevation beyond the reach of the cholera brooding in the Peshawur valley. The parallel was beautifully repeated in 1869. Although cholera showed itself generally in cantonments about the 11th, the actual outburst took place on the 18th and 19th, not in cantonments only, but throughout the valley generally; the villages and the camps of the 104th and artillery in different places were all simultaneously attacked. One body of troops only had the opportunity of escape—a wing of the 104th which marched on the 13th for Cherat. This wing did not actually get to Cherat until the 30th, but the move out of the valley was sufficient, for three men only were attacked on the march, of whom two died. The wing left behind, although moving about in the valley, had 99 admissions and 63 deaths. This is sufficient to show how inefficient as a prophylactic measure is mere movement in such a locality. (See Part I, page 203). Such facts as these teach, too, how valuable may be the time intervening between the first manifestation and the actual outburst. We have no difficulty in recognising that, had the valley been evacuated between the 8th and 17th, few out of the 234 individuals who were lost need have died.

Localisation in the Kohat valley, in continuation of the description given of the same phenomenon in the report for last year.

I may finish here what remains to be said regarding the effects of elevation. Into the Kohat valley the cholera descended in enormous power. One regiment of native infantry, the 2nd Punjab Infantry, lost the unprecedented number of 67 men; and altogether, out of a native force of 2,200, 136 men died. The aspect of this outbreak I have tabulated above. This Kohat valley is the very locality which I selected in last year's report to illustrate what is meant by the localisation of cholera, and what I have there described (p. 212) as occurring in 1858 was exactly reproduced in 1869. This cholera entered the Kohat valley, or at least began to show itself, on 4th October, at the time when the immediate outburst in the Peshawur valley ceased. But the aura of the cholera of the first week of September was probably felt here, for throughout September a choleraic tendency was clearly to be noticed in many fever cases.*

The garrisons of Nowshera and the stations east of the Indus escaped, because of the geographical situation and physical aspects of those stations.

But while cholera was falling thick into these valleys, the distance of a few miles sufficed to dissipate the force of the miasm, and, as in 1858, 1862, and 1867, the European regiment at Nowshera lost but two men out of its strength; and east of the Indus, Attock, Abbottabad, Campbellpore, Rawul Pindee, and the new station of Tullagunge, showed not a trace of cholera among the troops.

The aspect of the outbreak as determined by the passage over a district of the aura of an air-conveyed cholera.

I have said that many districts of Upper India got this great cholera of 1869 in shadow only; this contingency necessarily goes far towards determining whether the outbreak of a cantonment shall be shown in strength or not. An officer is struck down with deadly cholera on 4th June at Sealkote, and nothing more is heard of cholera in the Sealkote District throughout the year; this cholera is said to have followed immediately after a large draught of water had been swallowed. At Ferozepore a single man of the 5th Fusiliers dies from cholera induced by an apparent exciting cause; and again, at Jullundur a single man is picked off by cholera when not a case is reported in all the district. These instances are parallel with those given at pages 165 and 176, and again noticed at page 218 of the report of last year. Both at Kohat and Peshawur the epidemic fever was very prevalent at the time of the outbreak, and the intensity may in some measure have been influenced by the depression caused by the malaria miasm. In the 36th Regiment it was particularly noticed that the invalids of the season and weakly men suffered.

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* Report by Assistant Surgeon Kelly, quoted by Sanitary Commissioner, page 42 of his Report for 1869.

Loss of the European and Native Troops cantoned within the monsoon area contrasted.

Taken throughout the monsoon area, the loss of the European troops was seven times greater than that of the native troops occupying the same area; in the case of the Europeans the death-rate was 13·62 per 1,000, and in the case of the natives 1·97 per 1,000. And even this great disparity was lessened by the fact of the almost entire exemption of the Meerut and Lahore Districts, which tells in favour of the rate for the Europeans. In the Peshawur valley the ratio of loss of European soldiers was three and a half times in excess of that of the native troops; the European force lost 115 per 1,000 of the actual strength, and the native force 33 per 1,000. No station occupied by Goorkhas lay within the epidemic area of 1869.

Comparative loss of the Europeans in the Lucknow Cantonment and of the native population of the city of Lucknow.

A sad instance of the vast disparity in the liability to cholera was exhibited in the course of the cholera of 1869 in the case of Lucknow This great city with a population of 270,000, afforded to an accurate registration but 173 deaths in 1869, while the cantonment with a population of 3,100 Europeans, men, women, and children, yielded 97 deaths during the outbreak.

At page 230 I have shown that an unacclimatised regiment is apt to suffer far more from cholera than an acclimatised regiment when placed in parallel circumstances. In this year the 102nd, stationed at Lucknow, lost 11 men, while the 62nd in the same cantonment, which arrived from England in February, lost 33 men out of an equal strength.

The intensity of the disease cholera has not been less than in previous epidemics. Out of each 100 Europeans attacked there have died of men 63·55, of women 62·77, and of children 76·06. The ratio for the Regular Native Army has been 57·48, and for the Punjab Force 71·36. For prisoners the ratio has, as usual, been very much less, namely, 42·39 per cent. of those attacked.

The low death-rate of the jail population throughout the epidemic area.

It is remarkable to find how little the jail population throughout Upper India suffered from this epidemic cholera. In the invasion of July all the jails of the Behar Provinces were attacked; but to the west of the Behar Provinces the Goruckpore Jail alone suffered heavily, losing 34 prisoners. The distribution, however, was typical, and the geography of the cholera of the year is as truly indicated by the sparse cholera of the jails as by the outbreaks of the European army. The intensity, as regards the jail population, I consider to have been modified by the conditions which in the case of the same type determine a ratio of liability to malarious influences much lower than that of the general population. These are the height of the walls by which they are surrounded, and the exclusion of aërial influences immediately after sunset, when the prisoners are locked up for the night.

Loss in the Lunatic Asylum at Lahore.

Lunatics as a class are singularly susceptible to the attack of cholera. While Lahore generally suffered so little, 17 per cent. of the lunatics in the asylum died. Of the female lunatics 36 per cent. died. There were altogether 34 deaths in the asylum.

Apparent immunity of very young children as shown in the returns of European children for 1869.

It would appear that young children at the breast are wonderfully exempted from the attack of cholera. I found this statement upon the figures for the year 1869 only; but it is right that the fact should be noticed here, in order that the results of future observation may be recorded. Even for 1869 the returns are very imperfect in regard to the ages of children who have died; but as far as these show, the immunity of very young children was all but complete. In 45 cases the ages are not stated; but in a register of 63 cases in which the age is given, the death of one child only below 12 months old appears.

I find that the same observation was made in St. Petersburg on the occasion of the original invasion of Russia—that while in the Foundling Hospitals many of the nurses died, the children entirely escaped.

Results of the establishment of quarantine in various localities during the progress of the epidemic cholera of 1869.

Throughout the epidemic area of the year, quarantine failed signally in every case in which it was attempted; and the absence of quarantine did not determine the invasion of tracts naturally exempted. A cordon of sentries placed around the cantonment of Peshawur failed to avert the universal outburst. The occupation of the passes between Peshawur and Kohat did not secure the Kohat Valley against the catastrophe of October. When the Magistrate of Shikarpore claims that this district was protected by quarantine against the cholera of Sukkur, we require to take into account the fact that no district to the east or north had cholera, and that the country from Bhawulpore to Hazara, and the corresponding districts lying west of the Indus, constituted one great exempted tract in 1869. We have no difficulty in concluding that the quarantine at Attock had nothing to do with the exemption of the country lying to the east, since this area was exempted in accordance with laws taught by all previous epidemic history. The claim that the Jullundur District was exempted from cholera as a consequence of the establishment of quarantine on the Beas, could be advanced only by a local observer unacquainted with the general relations of epidemic cholera in 1869. When in answer to the query—was quarantine successful? the local observer appeals to the simple fact of the exemption of his district as evidence of success, his statement is of no scientific value until its weight is determined after the local fact is placed in its position among the occurrences which go to make up the general history of the year.

Local observers have failed to connect the outbreaks of 1869 with the poisoning of the water-supply by the emanations from those suffering from cholera.

The failure to connect local outbreaks with a polluted water-supply has been general throughout the epidemic area. That the great outbreaks such as those above tabulated were unconnected with the local water-supply is proved by the shape which they assumed (see page 199 of previous report). That moisture is a localising cause as well as a vehicle for cholera, the natural history of the outbreak over an area teaches; and that the cholera which was being propagated at Umritsur from the 27th May to 10th July in order to become the materies of the great outbreak of July and August, may have been grown in the pools and tanks which afforded a water-supply to the population and moisture to the surrounding air, is not at all improbable. But that this same materies was derived from the excreta of those suffering from cholera, there is no evidence whatever to show. From one end of India to the other the poisoning of water from such a source is denied to be the originating cause of the cholera of the year. And well it may be when we reflect that the area covered by cholera extended from the frontiers of China to Russia and Central Africa.

Again in 1869 we have had the illustrations from previous epidemics which have already been employed to prove the contagious nature of cholera, the infection of hospitals, and the spread of cholera by common latrines, brought up to prove that previous observers who held such views were in error, and that a cholera-polluted water-supply was the real cause of the phenomena of these outbreaks. It is sufficient to remark that not one additional fact has been added to those at hand at the time of the occurrence, when the theory in question was weighed and found wanting.

The Sanitary Commissioner for the Central Provinces places a very high value upon a pure water-supply as a means of averting the outbreak of cholera. He reckons the liability of the individual to suffer from cholera during an epidemic as exactly proportioned to the purity of his water-supply; and he thinks, from the facts of the year that have passed under his notice, the conclusion is warranted "that, with respect to the general population of the country, the imbibition of water containing animal organic impurities is the most common means by which personal susceptibility to the effects of the special cholera contagion is induced." But his views are liable to be misrepresented, and therefore it is right that I should quote his own words on this most important subject. He writes:—

"Regarding the relation between the use of impure water and the development of cholera, there is no reason to believe that water impregnated with impurities of the kind above described, is ordinarily the exciting agent in the production of cholera, or the immediate cause of the disease. It is, indeed, not improbable that the excreta of patients suffering from the disease contain the infecting matter of cholera, and that the disease may be sometimes directly communicated by such matter being introduced into the drinking water; but that cholera can be rapidly diffused over a wide area by such means is scarcely possible; it is altogether improbable that in the large number of villages attacked during the dry weather of the present year, cholerałc excremental matter can have been introduced into the water-supply; and the pollution of wells or other sources of supply by means of the vessels used in drawing water, I believe to be an accident that very rarely occurs."

In the Central Provinces alone 4,200 villages and towns were attacked, and 49,000 people died in the few months during which the cholera persisted. This single fact standing alone is sufficient to prove how little direct poisoning through the evacuations of cholera patients could have had to do with the general aspects of cholera in the Central Provinces in 1869.

In reply to the direct questions put by the Sanitary Commissioner—Is the water-supply of good quality?—Is there any evidence to lead to the suspicion that the water may have been the medium of communicating or spreading the disease?—Is it probable or possible it may have been contaminated by simple, and especially by cholera discharges?—sixty-seven medical officers of the European corps which suffered in 1869, the total furnishing replies, one and all answer that the water was of fair quality, and that it could not have been contaminated, nor have proved the medium by which cholera was spread. One officer alone suggests that the water used for watering the tatties of the married quarters of the artillery at Morar may have had a bad effect, as it was drawn from a well which is not used for drinking purposes on account of its impurity.

The outbreaks of 1869 were not in any instance attributed to the use of the regimental latrines.

Not one of these medical officers suggests that the regimental latrines may have proved a source of cholera, or may have spread cholera among the men.

The question of the effects of attendance on the sick will be treated of by the Sanitary Commissioner.

The Sanitary Commissioner will consider the special questions of the effects of the employment of European soldiers as orderlies in hospitals during cholera outbreaks, and the apparent infection of attendants on the sick generally. Nothing is more difficult than to come to a satisfactory conclusion from the mere fact that some out of those so employed are attacked. When 19 per cent. of the whole garrison of Peshawur suffered, we may be quite certain that not less than 19 per cent. of those employed in attendance on the sick were attacked; and yet such an instance is one which, mentioned without reference to the ratio of attack for the garrison generally, is startling, and might be employed unthinkingly towards proving the contagiousness of cholera, when no such significance can be attached to it. Here and there, in different reports, mention is made of individual instances in which it would seem that an attendant on a cholera patient was attacked because of his proximity to the individuals already affected. Thus, when, at Lahore, an American missionary was attacked, a Native Christian who attended on him was seized, and also his wife. But such cases require to be carefully looked to. The fact that the wife also was attacked does not strengthen the case, since it points to the probability that the two, the man and wife, and perhaps the whole three, suffered from one common influence operating on all.

The term "the importation of cholera" as used by different observers. Cases in which it has been asserted that the epidemic cholera of 1869 of districts was due to importation.

The term "importation of cholera" is employed very differently by different observers. The question is asked, whether cholera was imported into Meerut, and a medical officer replies that cholera was imported, because on 7th August a sepoy of a Morar regiment was taken moribund from a railway carriage, and was carried to the lines of the 36th Native Infantry, where he died. Now, not a case of cholera occurred among the Native Troops at Meerut during 1869, nor did a case of cholera show itself until nearly a fortnight afterwards, when Meerut and the surrounding districts were invaded. The idea seems to be present in the mind, that first cases necessarily become foci, and that around such cases the cholera of a city or district clusters. Were this the case, we should have no difficulty in determining it for a fact. But this belief coincides with the theory so generally accepted, that human intercourse alone is the cause of the dissemination of cholera; and hence, when we find a medical officer holding this theory, we invariably find him also writing as if importation were a fact, and a thing which occurs as a matter of course, and perhaps promulgating as true a statement made to him by some second, and probably uneducated, person, whose opinion is valueless for purposes of scientific research. If there be any truth in what I have written of cholera as an air-borne miasm, the truth is primary; and while granting that many secondary manifestations of cholera may occur in relation to human intercourse, not one instance in which a district generally is alleged to have been infected from a focus, should be allowed to pass without the strictest scrutiny.

Alleged radiation of cholera from Umritsur as a centre.

When we are told that in 1869 cholera radiated from Umritsur as a centre, we do not ask whether or not it was a fact that persons flying from Umritsur into the districts around were seized with cholera, but whether these individuals formed the foci from which cholera spread in the districts into which they fled. Whether they did or did not in this instance I cannot tell, because I have no data which show that such persons did become foci. I look at the case in its general aspects, and I find that this cholera culminates in the Umritsur district, in Lahore, in Goordaspore, and in Goojranwalla, exactly at the dates at which it culminated elsewhere over the epidemic area; and I perceive that the limit of the affected tract in the west, the north, and the east is the same as in the epidemic of 1861—that Jhelum, Goojrat, and Sealkote enjoy complete immunity, and that not a case of cholera finds its way into the Hoshiarpore, Loodianah, or Jullundur districts lying immediately to the east.

The evidence in favour of the importation of the cholera of 1868 and 1869 into the different districts of the Central Provinces is not satisfactory.

Regarding the method by which the cholera invading the Ahmednuggur district from the north-east entered, the Sanitary Commissioner for Bombay says simply, that the impossibility of obtaining trustworthy information rendered the attempt totally futile.*

As the result of his enquiry, the Sanitary Commissioner for the Central Provinces comes to the conclusion that the evidence is in favour of the contagion of cholera having been brought into his province from without, and he considers that the subsequent diffusion of the cholera was effected solely by means of human intercourse. The fact of introduction in 1868 he failed to trace, and his conclusion that cholera was brought in from the north is deduced from the circumstance that the coolies, among whom the epidemic of the year first showed itself, were hutted within 300 yards of the Nagpore Road. His conclusion regarding diffusion is founded on the facts of epidemic spread, and of its appearance in the different towns and villages of the epidemic area. His opinion is, that isolated cases became focal centres; "but," he adds, "there are on the other hand many instances in which the arrival in a town or village of persons suffering from cholera was not followed by an outbreak of the disease among the population." And again he writes—"The accounts given of the outbreaks of cholera at Kyra, Soonwarra, Gokulkara, and Bhoodooa afford evidence that the disease may be imported into a place by persons in whom no symptoms of the disease are apparent; and in other instances, as at Sehora and Rana, the importation of the disease into one village was so closely followed by an outbreak in another, with which it is in frequent communication, that, though the actual transmission of the choleraic influence cannot be proved, the presumption in favor of its having been effected by means of personal intercourse, and by persons not evidently suffering from the disease, is very strong."

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* Report for 1868, page 177.

Raipore, perhaps the worst cholera tract in India, had had no cholera since 1866. In 1868, when the adjoining districts, Jubbulpore, Seonee, and Mundla, suffered, no cholera appeared in Raipore. The Civil Surgeon writes—"On 12th May the disease may be considered to have broken out in an epidemic form, and to have been scattered throughout the district." The invasion in one instance is made to cluster round the fact that two cartmen, coming from the Belaspore district, returned to their villages in the Raipore district and got cholera on 29th April, and that these same villages suffered in the first week of May. Whether or not these men had cholera on arriving at their homes we are not told, but they died with the rest of the villagers. Now at a distance of 18 miles there is a village called Baheera, and here was collected a body of 3,400 coolies, who were joined by another body of 66 from the Belaspore district on the 7th May. When these 66 coolies left the Belaspore district cholera was epidemic or was becoming epidemic. The Sanitary Commissioner thinks that cholera broke out on the day they left, or the day before. These men also are alleged to have introduced the cholera which became universal after the 12th May. The attack illustrates the fact of a body being struck—"About 2 P. M. on the 12th May," the date assigned by the Civil Surgeon for the general diffusion of cholera, "after the midday meal, when the coolies were just going to recommence work, 23 persons were seized. By the evening of the same day 160 persons had been seized, and of these 52 died." This is the report of the Deputy Commissioner, written on the 17th, and he died from cholera a few days afterwards. In this letter it is distinctly stated that not one of the 66 men abovementioned got cholera. Captain Twyford, who was on the spot, remarks—"It is ascertained that none of them have died, and they have remained to the last." This is contrary to the statement of the Civil Surgeon of Raipore, who says that they got no cholera until the 13th of May, when several fatal cases occurred amongst them. The Sanitary Commissioner remarks that this is perhaps the most noteworthy instance of importation that he has to record; and to make the history complete, it requires the bridge to which I have referred at page 237 of my former report.*

The phenomenon of the spread of cholera from foci is not seen in the case of emigrant ships, where, from experience of contagious diseases, we know that spread from a focal centre is certain to occur after the introduction of the zymotic germ.

The general assertion of the spread of cholera from foci is not to be accepted merely, because the occurrence is theoretically regarded as possible. I have shown clearly that, studied on a basis of statistics, the shape of the outbreak of cholera is *diametrically* opposite to that of a contagious disease. And nowhere is the spread of contagious disease from foci more dreaded than in India. The histories attached to our jails and emigrant ships warn us how the germ introduced weeks, and it may be even months, before leavens insidiously day by day the whole body, and hundreds are dead before the fire of the outbreak burns out, generally months from the date at which it has appeared.

The outbreaks on board emigrant ships taken in the aggregate assume the typical form.

But in the case of emigrant ships, where the spread of cholera from foci in its fullest development should be looked for, judging from the illustrations which have been afforded in the case of contagious fevers, and where community of condition suggests the probability of numbers suffering from the operation of one common agency, the shape of the outbreak is identical with what I have shown it to be in all our types (see pages 178, 188, 191, and 192). The facts of the introduction of cholera into districts in India as well as into countries beyond sea, must be studied in relation to the results which I have tabulated below, from data supplied, at the request of the Sanitary Commissioner, from the Office of the Protector of Emigrants in Calcutta. The return as furnished shows the dates on which cholera cases appeared in the emigrant ships leaving Calcutta for Mauritius and the West Indies between 1850 and 1865 in the first case, and between 1861 and 1869 in the second. There are confessedly great difficulties in dealing with the registers of deaths, and that portion referring to the Mauritius for the years from 1861 onwards is so evidently erroneous and at variance with the experience of 1850 to 1860, and of the entire table for the West India emigrants, that I have struck it out in arranging the figures below given:—

Statement showing the Aspect of the Outbreak of Cholera on board Emigrant Ships leaving Calcutta for Mauritius and the West Indies.

EMIGRANTS.		DEATHS OF EACH DAY AFTER LEAVING CALCUTTA.																					TOTAL.
		1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	After 20th.	
Mauritius, strength ...	22,077	19	28	28	21	33	26	13	13	10	10	11	9	8	10	5	1	5	1	3	1	9	264
West Indies, strength ...	8,284	..	4	10	2	12	3	10	6	6	8	7	2	1	3	...	2	...	...	...	...	5	81
TOTAL ...	30,361	19	32	38	23	45	29	23	19	16	17	18	11	9	13	5	3	5	1	3	1	14	345

Besides these deaths, 32 occurred of which the dates could not be ascertained.

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* At page 224 of the present report I have shown the general epidemic connection of the cholera of Raipore.

During the period to which this table refers, there were despatched to Mauritius 105,382 emigrants, and to the West Indies 72,681. Of these, a strength of 30,361 was rendered immediately liable to the attack of cholera by its appearance on board of 82 ships after leaving port. The average number lost in each outbreak was under 5 ($4\frac{2}{3}$), and that the disease was not perpetuated nor propagated is shown by the aspect of the above table. In the case of the West India ships the type is perfect; and there is every reason to believe that errors in diagnosis have to some extent damaged the facies of the figures in the first line. Out of 20 ships bound for the West Indies, two only show a mortality exceeding 10; one ship shows 11 deaths, and the second 16. But this last was the unfortunate *Fusilier*, and these were no doubt sudden deaths from typhus, from which the vessel lost 50 per cent. of her emigrants before she was lost at the Cape.

CONCLUSION.

In these pages I have very hastily sketched the general outlines of the history of cholera in 1869. I have given the views which presented themselves to my mind during or before the occurrence of the events, as well as the results of my study of reports and statistics furnished after the occurrences of the year were completed. The special and secondary aspects of the cholera of the year have received due attention, and the sanitary officers of provinces will relate the history of the year as they have recognised it among the communities which have suffered. The records in which the secondary aspects of epidemic cholera are treated of do not immediately come under my cognisance as statistical officer; and such instances as I have noticed here have been brought up in connection with representations which vitally affected the integrity of the general epidemic history of the year.

In my report of last year I affirmed that the history of the cholera of the epidemic area could for any year be written as a history or as a narrative—tangibly one story throughout, with all the links of the chain complete. And the grounds upon which I made the statement were, that the cholera of India has aspects which are primary, due to what cholera is an individuality, and to the obedience which it pays to the natural influences which in every year prevail in Hindostan. Maintaining this view, I have sketched the history of 1869 as I have done, and tried to show the controlling laws under which the leading events have taken place. If in some respects the anticipations formed failed of accomplishment, in others they were as signally fulfilled. At the end of the experience of another year I would willingly write again all that I have written in the conclusion of last year's report. Of this the sum is, that for many years to come we shall be as often wrong as right in the anticipations which we may form, but that accumulated experience will year by year teach us better what we may expect, in accordance with the age and geography of the epidemic in progress. I have distinctly said that we are not to dogmatise; that because we find cholera epidemic, it shall follow one definite course or show one definite history. In the future many epidemics will undoubtedly shape themselves after the type of the epidemics of 1817, 1855, and 1859; but, just as certainly, we shall find others which will have as their counterparts the epidemics of 1863, 1866, and 1868. As they occur we shall recognise the resemblance, and we may then be able to appreciate better than we have done in the past the laws under which they assume the form which they present.

APPENDIX C.

RULES REGARDING THE MEASURES TO BE ADOPTED ON THE OUTBREAK OF CHOLERA OR APPEARANCE OF SMALL-POX.

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(G. O. C. C. No. 193, *dated 3rd August* 1870*)*.

The following revised rules regarding the measures to be adopted on the outbreak of cholera amongst British troops are published in supersession of all former orders on the subject.*

SECTION I.

PRECAUTIONS NECESSARY IN ANTICIPATION OF THE APPEARANCE OF CHOLERA.

Necessity for constant attention to the sanitary condition of the station.

The outbreak of cholera is often so sudden and virulent that all precautionary measures must be taken beforehand. Experience has shown that, like many other diseases, the extent of its diffusion is in no small degree dependent on local insanitary conditions, and it is therefore essential that every station should be preserved in a state of constant preparation to meet a danger which may come at any time. The personal cleanliness of the men is a matter of much consequence as a preventive measure.

Increased vigilance demanded if cholera threatens.

2. General and other officers in command should at all times give their utmost attention to the conservancy and general sanitary condition of a station. If an outbreak appears probable, every ordinary precaution should be attended to with increased vigilance, but if the disease has actually appeared in the cantonment or its vicinity, more harm than good is likely to arise from any attempts at improvement which may then be made. This is not the time to cleanse foul drains or to remove nuisances which may have hitherto been neglected, and such possible sources of disease should, in these circumstances, be left undisturbed.

Duties of Staff Surgeon and Cantonment Magistrate as regards the Bazaars.

3. Whenever cholera is to be apprehended, the Staff Surgeon and Cantonment Magistrate should keep a special watch on the condition of the bazaars, and any case of cholera should be immediately reported to the Officer Commanding the Station. The register of deaths should be carefully scrutinized.

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* The same principles as are contained in these rules should govern the measures to be taken when cholera appears among *Native troops*; but as the disease rarely attacks them with any great severity, it is left to the Military and Medical authorities on the spot to determine in their case how far the procedure herein prescribed ought to be adopted under the particular circumstances.

Precautionary measures in Barracks.

4. Especial care should be taken to prevent crowding in barracks and hospitals, and, when considered advisable during the hot season, a portion of the men should be permitted to sleep in the outer verandahs, or in tents pitched for the purpose in the vicinity of the barracks. If cholera threatens, even though the men may have the full regulated amount of space, they should be spread out as much as possible, advantage being taken of any spare buildings which can be conveniently employed.

5. The early treatment of premonitory symptoms is of very great importance, and of these looseness of the bowels is the chief. At seasons, therefore, when cholera threatens, and still more so when it is more than usually prevalent, Commanding Officers should give the most precise orders on this subject, and see that measures are taken for paying the most vigilant attention to the health of the men in barracks, and for treating there, or in observation wards entirely separate from the hospital, all slight cases of diarrhœa or other disease, which, if neglected, might pass into cholera. As the men during cholera time have a natural dread of going into hospital, and are apt on this account to conceal the early symptoms in order to escape being sent there, it is of importance that every facility for the immediate treatment of diarrhœa should be afforded them in barracks. Non-Commissioned Officers in each room should accordingly be provided with suitable medicines, care being taken that the proportion of opium or any other dangerous drug should be small.

Sanitary measures necessary when new buildings are being carried on.

6. Whenever new buildings are being carried on, it is most important, with regard to the health of their future occupants, that the ground and water in the neighbourhood should be protected from pollution. Special care must be taken that proper conservancy arrangements are organized for workmen, coolies, &c., and that the orders are strictly enforced. The workmen should not be allowed to sleep in or about barracks and other public buildings under construction. They can generally find shelter in the neighbouring city or bazaars; but, in exceptional cases, where no such facilities exist, temporary huts should be erected for them outside the boundary pillars.

Communication with infected localities to be prevented.

7. If cholera appears among the Native population in the neighbourhood, communication with the infected locality should, as far as possible, be prevented. The same principle should be acted upon on all occasions during the continuance of the disease, for frequent communication with places where the disease is prevalent will always be likely to cause alarm and to produce bad results. As one valuable means of attaining this object, the provision of stores attached to the regimental canteen should be encouraged, so that soldiers and their families may be able to supply their wants without going to the city or bazaars.

Management of Native Soldiers returning from leave.

8. With the same object Native soldiers rejoining from leave, or otherwise returning from a part of the country in which cholera was prevailing at the time of their residing in it, or passing through it, should not be allowed to rejoin their regiments until it has been shown that they are free from the disease. This can easily be done by pitching a tent for their temporary accommodation outside cantonments when required.

Military and a Sanitary Authorities to make themselves acquainted with the country in the neighbourhood of their stations.

9. Officers Commanding Divisions, Districts, or Stations, as well as all Sanitary Officers, will make themselves thoroughly acquainted with the ground in the neighbourhood of their stations to the extent of 20 miles with a view to the selection of sites for encampments in the event of cholera appearing, as well as to such measures being taken as they may deem advisable to remove or counteract any probable source of disease.

Officer of the Quarter Master General's Department attached to the Command to prepare plan of the neighbouring country.

10. The Officer of the Quarter Master General's Department attached to each Command will prepare a plan of the required extent of country, on a scale of one inch to the mile, with the different encamping grounds marked on it, so that the troops may be placed under canvas without delay, whenever such a measure is considered advisable.

Points to be attended to in choosing encamping grounds.

11. In selecting these encampments, enquiry should be made into the previous character of the neighbourhood with regard to liability to cholera or exemption from it. The ground should, when possible, be high, with natural facilities for drainage, with a plentiful supply of good water, and, if possible, easy of access. Although rank vegetation is objectionable, the presence of large trees should be considered advantageous, because they add to the salubrity of the air, and because their shade will be valuable.

Number and situation of such grounds.

12. The circumstances of different cantonments vary so much that no definite rule can be laid down either as regards the number of such encamping grounds or their situations, but it is very desirable that several such places should be selected, and that their distance from cantonments should vary, some being close at hand and others further off.

Selection can best be made in the rainy season.

13. The greatest care is necessary in selecting good sites, and this can only be properly done during those days in the rainy season when sudden and heavy falls of rain afford ready and reliable proof as to the real suitability of any spot for a camp. The selection should be made in communication with the local Civil authorities, whose knowledge of the locality will enable them readily to point out the most eligible sites.

The use of selected camps obligatory, except when suitable buildings are available.

14. When sites for camps have been selected and approved by competent authority, care must be taken that they are always kept in a fit state for occupation, and it must be understood that, in the event of the troops going under canvas, these are the places which, as a general rule, are to be used. If, however, during the hot and rainy seasons, any buildings entirely separate and away from cantonments are available, they should be used in preference to placing men in camp, especially when the ground is either covered with water, or when it is drying up in the months of August and September.

Encamping grounds on great lines of communication are objectionable.

15. The existing encamping grounds, which are ordinarily used by troops on the march, are very commonly situated upon great lines of communication, and are therefore objectionable, for bodies of men supposed to be infected with disease ought always to be isolated as much as possible. For the same reason, if the supply of good water and other circumstances admit of a choice, the vicinity of a village, and especially of any large village, should be avoided.

And should only be resorted to when no others are available.

16. It may sometimes happen that these encamping grounds must be resorted to, either because no other places suitable in themselves can be found, or because during the rainy season they are the only ones easily accessible; but, when it is possible, ground not in the vicinity of great thoroughfares should be preferred.

Expense of preparing the encamping grounds need be very little.

17. In some instances a slight expenditure may occasionally be requisite in clearing the ground, in improving its drainage, in increasing or improving the water-supply, or in making it easy of access, and these, especially the two first, are matters of very great importance, which should receive frequent and careful attention. If ground be judiciously chosen, the expense need be very little.

Construction of earthen platforms not considered generally necessary.

18. As the sites will be selected almost with the certainty of their being required during the rainy season, they must be in themselves tolerably high and well-drained; the construction, therefore, of raised earthen platforms at these camps is not, as a rule, considered necessary, but where the nature of the ground is such that a dry site cannot otherwise be obtained for pitching the tents, the circumstances should be specially reported to the Quarter Master General, and sanction solicited for any such works of this nature as may be deemed advisable.

Selection of encamping grounds on the line of Railway.

19. In all divisions or districts on the line of Railway, encamping grounds, in addition to those already referred to, will be selected in suitable localities within 50 or 70 miles of military cantonments on these lines, in order that, should it be considered expedient, regiments or detachments may proceed thence by rail in the hope of getting clear of the radius within which the epidemic may have pronounced itself. In selecting these grounds, the general principles already laid down should be adhered to, but as carriage from the line to the encampment may frequently be a matter of difficulty, the spots chosen should not be further than one or two miles from the Railway, and, if possible, in its immediate vicinity.

SECTION II.

MEASURES TO BE ADOPTED ON APPEARANCE OF CHOLERA.

General preparations.

20. On cholera appearing, either in the neighbouring villages or in the cantonments, the authorities must be prepared for immediate action; every

ordinary sanitary precaution must continue to receive increased attention and every necessary measure prepared for placing the troops under canvas, should this be required. Everything must, as far as possible, be considered beforehand, so that, when the necessity occurs, there may be no doubt regarding the course to be pursued, and no reason for delay. The most suitable encamping grounds must be decided on, the vicinity of places in which cholera is prevalent being, of course, scrupulously avoided. General and other Officers in Command should act in anticipation of sanction on their own responsibility, and on the advice of the senior Medical Officer, reporting fully at the same time to the Quarter Master General, for the information of His Excellency the Commander-in-Chief, the measures they may have adopted to arrest the progress of the disease.

Preparatory Camp.

21. If cholera has been prevalent in the neighbourhood, and there is, therefore, reason to fear that it may attack the troops, a preparatory camp should at once be formed. This need not ordinarily be done until the disease has actually appeared in the cantonment; but if more than one case occur among the European soldiers or their families under such circumstances as have been above stated, the formation of the preparatory camp should be considered imperative. Tents should be pitched at the nearest selected ground, which, if possible, should not be further distant than two or three miles from the cantonments, so that all may be in readiness for a move in case it may be necessary. The size of this camp will, of course, depend on the strength of the garrison and other circumstances. In some cases it will be advisable to provide for a proportion of the whole garrison, in others only for part of a particular regiment or battery. The exact size of the camp must be decided by the local authorities after a full consideration of all the facts and of the amount of danger to be anticipated. The previous history of the station as regards cholera will afford valuable data on this point.

All unnecessary alarm should be prevented.

22. All unnecessary alarm among the troops or the community should be prevented, yet every arrangement should, under the authority of the Officer Commanding, be made by the Commissariat Department in connection with the Civil authorities for providing the carriage required to convey tents and baggage to and from the encamping grounds or railway stations, so that it may be at once available in case of its being required.

Military Authorities to send to other stations intelligence regarding outbreak and progress of cholera.

23. It is of the utmost importance that every station should receive notice of the possible approach of danger, and whenever cholera shows itself at a station or in a district, the fact must be at once reported by telegraph, when practicable, to the neighbouring stations. Information must also be sent from time to time of the progress or cessation of the disease, any circumstances being noticed the knowledge of which may appear likely to be useful at other stations. These reports may be always made in a few words, and need give but little trouble.

Military and Civil Authorities to communicate freely with each other regarding outbreak and progress of cholera.

24. All information received by the Military authorities should be at once communicated by them to the Chief Civil authorities of the District, who in

their turn must be held responsible for obtaining immediate notice of the outbreak of cholera in their jurisdiction, and of communicating the fact to the Military authorities without delay.

Transmission of information need cause no alarm.

25. The transmission of information regarding cholera need cause no alarm. If it be thought necessary, the reports may be considered confidential, but it is believed that this will seldom or never be desirable. The knowledge that the attack of the disease is considered possible will be far more likely to produce beneficial than mischievous results, and the belief that the authorities are alive to the danger and prepared to meet it, will tend to allay rather than to increase unnecessary alarm.

Utmost unanimity in all Departments and hearty co-operation with the Civil Authorities essential.

26. The utmost unanimity is essential in all Departments to give effect to the above recommendations; all should work cordially for the public good and in constant communication with the Civil authorities, whose hearty co-operation is especially needed with regard to the supply of carriage. They should use every lawful means to prevent delay in obtaining carriage for the troops, as the loss even of a few hours in moving troops away from a station may lead to most serious consequences. On all occasions every use should be made of the moveable column carriage. All movements of troops and changes of camping ground should be at once reported to the Civil authority of the District.

Telegraphic communication to be made daily to the Quarter Master General during the continuance of cholera.

27. On the appearance of cholera at any station, and during its continuance, the Officer in Command of that station is to report daily, by telegraph, when possible, to the Quarter Master General for the Commander-in-Chief's information, giving the number of admissions into hospital, the class of persons attacked, and the number of deaths in each corps at the station. Directions to be observed in despatching telegraphic messages are given in Appendix A.

Every effort to be made to provide means of healthy amusement and occupation for the soldiers.

28. Special attention should be paid to everything which can tend to the improvement of the general health of the men. Every effort should be made to relieve them from duties which cause needless exposure and fatigue, and especially to avoid night duty, so far as this may be possible with due regard to military considerations; to ensure that their food is wholesome and their clothing appropriate; and to promote every means of healthy amusement and occupation.

Use of spirituous liquors to be guarded against.

29. It often occurs that soldiers, on a visitation of cholera, indulge in the use of spirituous liquors, under the impression that they are a preventive against the disease. Medical authorities unanimously condemn this baneful practice as a certain promoter of the disease, and Commanding Officers should therefore exert their influence in every way to prevent it.

Abandonment of buildings in which one or more cases of cholera have appeared, and arrangements for accommodation of the inmates.

30. On a case of cholera occurring in any building occupied by European troops, the room, or portion of the building in which it occurred, should be IMMEDIATELY vacated, and, except for the purpose of purifying it, no one should be allowed to enter it;—if the whole building can be left, it will be still better. This is laid down as an absolute rule; for, although individual cases of cholera sometimes occur when there is no reason for anticipating an outbreak, instant removal from an infected spot is the best safeguard; and besides it is necessary that the room or building in which the disease has shown itself should be vacated for the purpose of being purified. When men, under the above circumstances, are removed from a building supposed to be infected, they must be kept separate, so far as may be possible, from the men among whom the disease has not shown itself, and, in arranging for their accommodation, care must be taken that there shall be no overcrowding either of them or of others. Should no separate buildings be available, it is desirable that they be placed under canvas.

31. In carrying out this rule, it is not, however, necessary that the tents should be pitched in one of the encamping grounds. They may be placed in some convenient spot in the cantonment; and where only an individual case has occurred among the body of men so removed, this arrangement will, as a rule, be the best which can be adopted.

Purification of vacated buildings.

32. When any case of cholera occurs, even though it may be but a solitary case, the room in which the disease has shown itself must be thoroughly purified without the least delay. The walls, floors, and punkahs should be scraped and white-washed; the wood-work should be subjected to the action of hot caustic lime-wash, furniture and ropes washed, punkah-fringes boiled, and generally everything possible done for the purification of the building; the latrine, urinary, and wash-house used by the man who was attacked must be instantly closed, and their use must not be permitted until they have been completely purified. Chloride of lime, Condy's fluid, or some other chemical disinfectant should be freely used. All filth and rubbish from the latrine must be buried at a distance, and all vessels used for their removal must be carefully cleaned and disinfected at the place where the refuse is deposited. Until the purification of the buildings is complete, the troops must, under no circumstances, be allowed to re-occupy them.

Buildings vacated on account of cholera when to be re-occupied.

33. Ten days after removal, and when the room or building which was vacated has been purified in the manner above described, it may be re-occupied, provided no other circumstances have occurred meantime which may render such re-occupation undesirable. On this point the opinion of the principal Medical Officer on the spot must be taken.

Procedure to be adopted on the occurrence of further cases.

34. If a second case of cholera appears among the particular body so removed, they should be again moved, and the infected building or tent which they occupied should be at once vacated and purified. If a third case occur among this particular body within one week from the occurrence of the first case, then the men composing it should be immediately removed from the station to the preparatory camp.

35. The procedure here laid down, if carried out with promptitude in successive instances, will often be found sufficient to arrest the further spread of the disease; but when cases occur in several buildings, either simultaneously or at short intervals, and especially if there be at the same time any unusual prevalence of diarrhœa, an outbreak of cholera is seriously to be apprehended, and it will, under such circumstances, be advisable at once to remove the inmates of infected buildings to the encampment outside cantonments.

36. It is to be remembered that, when an outbreak threatens, removal from the infected locality is the only remedy in which any confidence can be placed, and that the earlier the movements are carried out, the greater will be the chance of success.

As a rule, only such buildings to be vacated as have actually presented cases.

37. Cholera evidently attaches itself to particular localities. The principle to be borne in mind, therefore, is that the particular locality in which cholera shows itself must be looked upon as dangerous, that it must be immediately abandoned and all communication with it stopped, and that the body of men who have been exposed to danger by their occupation of the place in which the cause of the disease is presumed to be present, must be separated from the rest of the troops. If, for example, this body consists only of the inmates of some one building, the measure need only be applied to them; if some particular battery, troop, or company be attacked, it will be similarly dealt with. A whole regiment or the whole of the troops at the station need only be sent into camp when it is found that the measures already adopted have not stopped the progress of the disease, or there is reason to fear they will be insufficient. As a rule, it is necessary only to vacate such buildings as have actually presented cases.

Detachments to be kept separate.

38. When separate detachments are moved into camp in the manner indicated, it is advisable that they should be kept distinct as far as possible. Officers Commanding Stations are authorized to call freely for medical aid from other stations, districts, or divisions free from cholera. And, where a separate hospital establishment cannot be assigned to each party, it may be convenient to place a hospital in some central position not far removed from two or more camps, the sick from which may be treated together. Such arrangements must be left to the decision of the local authorities. A central cholera hospital should on no account be established in cantonments for the reception of cases from camp and other quarters.

Special preparations necessary on appearance of cholera at stations on the line of Railway.

39. On the first appearance of cholera at any of the stations on the line of Railway, intimation should be given to the Railway officials of the probabilities of a movement being required, in order that the necessary trains may be in readiness, so that if any move be decided upon, it may be carried out without delay. Tents should also be forwarded by rail and pitched at the selected camp.

No move by rail to be made without sanction from Army Head Quarters.

40. As however all stations on the line of Railway are in telegraphic communication with Army Head Quarters, no move by rail should be made without the sanction of His Excellency the Commander-in-Chief, obtained through the Quarter Master General, every preparation being meanwhile made in anticipation, and the troops, if necessary, being moved temporarily into a convenient camp.

All movements by rail to be made during the day.

41. In travelling by rail it will be better to select the day than the night. On no account are cases of cholera or diarrhœa to be placed in a Railway carriage, and any persons who have come in contact with such cases should have their clothes fumigated with sulphur, and their hands and other uncovered portions of the body washed with a solution of McDougal's disinfecting powder before starting.

Camps at station of departure and arrival.

42. In some cases to avoid fatigue it may be advisable to encamp the men close to the station of departure, so that they may start by rail in the early morning, and they may encamp again for a night close to the station of arrival before going on to the selected ground next morning.

Trenches should be dug at convenient intervals on the line.

43. Previous to detachments proceeding by rail, the Military authorities must arrange for trenches being dug in the vicinity of one or two of the stations at convenient intervals on the journey, so that all discharges may be received in them. The troops on no account should be allowed to use the Railway Station latrines.

Purification of carriages occupied by troops.

44. After occupation by the troops, and in the presence of the Railway authorities, all the carriages, which must be only those of the 2nd and 3rd class, are to be washed under regimental arrangements with boiling water, containing in each gallon a wine-glassful of carbolic acid, after which sulphur should be burnt in each, and the doors and windows kept closed on the sulphur fumes for two hours. These disinfectants must always accompany the troops, and their supply be ensured by the Medical authorities.

Conservancy of camps.

45. As the movement will be made in the hope that the troops may be in this manner carried out of the infected area, the camp will probably be occupied for some time, and the strictest possible attention should be paid to the conservancy, trenches should be dug to leeward, tents pitched over them, and all filth instantly covered with earth. A similar system should be adopted for the camp-followers and other natives. The strictest regulations must be laid down and enforced by the Commanding Officer to ensure attention to this all-important point.

Arrangement of the camp.

46. In arranging the camp the tents should be spread over a large area, and any military considerations or regulations in regard to distances between tents should give place to the desirability of allowing free ventilation so far as this can be done with convenience. Tents should not be pitched immediately under trees, as they prevent the free access of air at night, and during the rains prevent their drying.

Number of men in a tent.

47. As a rule, not more than eight men should be placed in each tent.*

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* This rule is to be read in connection with No. 66. It is by no means intended that every regiment should be provided with a double supply of tents. The necessity for vacating *all* the buildings in a station which are occupied by the troops will rarely occur. Experience has shown that many stations have not suffered from cholera with any severity for years, and to provide extra tents for them would therefore be unnecessary. Again, there are other stations which are on the line of rail, and which can thus be supplied with extra camp equipage if required on very short notice. In such stations, whenever cholera appears, notice should be given to the nearest magazine that tents may perhaps be needed; and when it seems that those on the spot are likely to prove inadequate they can be telegraphed for. In a third class of stations there is an arsenal on the spot.

Immediate benefit from change not always to be expected.

48. Immediate benefit is not always to be expected from the movement into camp, and the occurrence of a few cases of cholera ought not to be looked upon as proof that the change has proved a failure. It is clear that men often take with them the seeds of cholera, and although the immediate cessation of the disease is by no means uncommon, it is unreasonable to suppose that this will be always the case. Even if the first apparent result be an aggravation of the disease, this need cause no discouragement.

Removal of camps—marches to be short.

49. If the disease continue to be virulent for more than three or four days, a fresh encamping ground may be tried, either on the line of rail, or by a short movement, at right angles, if possible, to the prevailing wind, or track of the disease. The marches should always be short, if possible not more than two or three miles; movements should generally be made in the morning, in time to admit of the new ground being reached soon after sunrise, but if the march is very short, it may be made in the evening, whenever the delay of a night is regarded as an unadvisable risk. The men will be supplied with hot tea or coffee before starting; they will invariably wear flannel belts, and every precaution must be taken to prevent their remaining in damp or wet clothes, especially when the movements are made by rail. It is of the utmost importance that fatigue and exposure should be avoided, and everything possible should be done to keep the men cheerful and in good spirits.

Isolation of camp hospitals.

50. If any case of cholera or diarrhœa occurs in camp, isolation and disinfection should be had recourse to, and all communication between the camp and any neighbouring station or village should be interdicted. The hospitals in particular should be isolated to as great an extent as may be practicable.

Separate hospitals in camp.

51. When all the troops in a station are sent into camp on account of an outbreak of cholera, all ordinary sick capable of being removed without evident danger should go into camp also; the few patients who cannot possibly be moved should be transferred to one small general hospital, which will usually be found sufficient for all those who must remain in cantonments. Separate hospitals should always be organized in the camps, and under no circumstances should patients be brought for treatment from the camps to a hospital in cantonments.

Cots to be taken into camp.

52. When considered desirable by the principal Medical Officer on the spot, cots are to be taken into camp for all the men, so that there may be no necessity for their sleeping on damp ground. In the event of carriage being insufficient for the regular cots, the Commissariat Department will usually be able to arrange for the supply of light native charpoys, which answer admirably. Should the season of the year not necessitate cots being taken, straw will be supplied, on requisition, by the Commissariat Department. If the troops travel by rail, the straw can either be taken in the train, or be furnished by the Commissariat at the selected camp.

Water-supply.

53. The utmost attention must be paid to the drinking water. At encamping grounds which have been frequently used, and which are situated upon great thoroughfares, caution will be especially necessary, and, if considered desirable, temporary wells must be sunk, so that there may be no danger of

water contaminated by organic matter being supplied to the troops. As a precautionary measure, the water used for drinking should be boiled: and as the taste of water subjected to this process is insipid, the reason for this proceeding should be carefully explained to the men. It is left to the local Military and Medical authorities to decide whether the filters belonging to British regiments are to be taken with them when the troops are moved into camp on account of cholera or not.

Wood-fires to be maintained when necessary.

54. Wood-fires may be maintained to the windward of camp when considered necessary by the Medical authorities.

Return of troops to cantonments.

55. It not unfrequently happens that troops are allowed to return far too soon to cantonments or to buildings which have been infected with cholera, and the consequence is the re-appearance or aggravation of the disease. The return to cantonments must only be allowed with the greatest caution. No part of the cantonment from which the disease has not altogether disappeared should be re-occupied. Under no circumstances can the re-occupation of any building which has been attacked by cholera be allowed, unless at least ten days have elapsed since the last case of cholera in the building, nor until every measure for the purification of the building, as laid down in paragraph 32, has been carried out. The prevalence of fever or other diseases in camp is no reason for returning to cantonments while danger from cholera remains. It must be accepted as the lesser evil of the two.

All movements to be communicated by post to the Quarter Master General on the day of occurrence.

56. Officers in Command of Stations are required to communicate, by post to the Quarter Master General on the same day the occurrence takes place, all movements of troops including changes of camping grounds consequent on cholera or other sickness, stating the number and class of persons attacked, the number of deaths, and any other matter appertaining to the Quarter Master General's Department.

Weekly communications to be made to the Quarter Master General during the continuance of cholera.

57. During the continuance of cholera at any station, the Officer in Command is to report by post weekly to the Quarter Master General, for the information of His Excellency the Commander-in-Chief (with respect to the steps to be taken for the mitigation of the evil), on the general sanitary condition of the station, including bazaars, and on the health of the population around on a considerable radius. The report should state in detail the number of cases, the class of persons attacked, the number who may have died, and the general character of the disease, whether virulent or not.

Returns required from Batteries of Royal Artillery and Regiments of British Cavalry and Infantry.

58. When cholera appears at a station, the following returns are to be kept by Regiments of British Cavalry and Infantry and Batteries of Royal Artillery;—No. 1 is to be furnished daily by Medical Officers to the Officer Commanding the Regiment or Battery, as the case may be, for the information of the Officer Commanding the Station, and a duplicate to the Deputy Inspector General of Hospitals, Her Majesty's British Forces. At the termination of the epidemic the Nominal Register (Form No. 2) is to be submitted to the Deputy Inspector General of Hospitals, and by him forwarded for the information of the Inspector General.

No. 1.

*Morning State of Cholera in the*____________________

STATION ____________________, *Date*____________________

Distribution of Corps.		Strength.	Cases of Cholera.						Remarks.
			Remained.	Admitted during the last *24 hours.	Total.	Discharged.	Died.	Remaining.	
In Cantonment Barracks.	Officers								
	Men								
	Women								
	Children								
	Total								
In Camp in Cantonments.	Officers								
	Men								
	Women								
	Children								
	Total								
In Cantonment Hospital.	Men								
	Women								
	Children								
	Total								
In Camp at	Officers								
	Men								
	Women								
	Children								
	Total								
In Camp at	Officers								
	Men								
	Women								
	Children								
	Total								
	Grand Total								

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* This should include the 24 hours from 8 A. M. to 8 A. M., so as to give the latest information. It should be made up after the Surgeon's morning visit to hospital.

Summary.

	Strength.	Number of cases previously reported.	Number since admitted.	Total.	Number of deaths previously reported.	Number since last report.	Total deaths.	Number remaining.
Officers								
Men								
Women								
Children								
Total								

Surgeon in Medical Charge.

No. 2.

Daily Nominal Register of cases of Cholera in the Regt. of during the year ____________

STATION____________, *Date*____________

Date.	Rank.	Name.	Age.	Company.	Previous health.	Habits.	Period of service in India.	Whether married or single.	Hour of admission.	Date and hour of attack.	Whence admitted.							Result.				Remarks.
																		Died.				
											Barrack No.	Married quarters No.	Hospital, and cause of original admission.	Camp at	Camp at	Camp at	Camp at	In stage of collapse.	In stage of re-action.	How long after admission.	Recovered, and date.	

This Register should include all officers, men, women, and children attacked.

Surgeon in Medical Charge.

Return required from Regiments of Native Cavalry and Infantry.

59. From regiments of Native Cavalry and Infantry, Return No. 1 only will be required.

Special report required on disappearance of disease.

60. On the disappearance of the disease, Officers Commanding Divisions and Districts in which cholera has recently occurred among the troops are required to submit a special report (in duplicate) to the Quarter Master General for the information of His Excellency the Commander-in-Chief, showing in detail the number of cases, the class of persons attacked, and the number of each who have died, the general character of the disease, and whether any and what extra expense was caused to Government by movement into camp, &c.

Return required showing the further progress of the disease among the inmates of any particular building that has been vacated.

61. In all cases where buildings have been evacuated on account of the appearance of cholera, a very careful record of the further progress of the epidemic among the individual body of men, women, and children who occupied each building so vacated, should accompany the above report, prepared according to the following form:—

Progress Report of Cholera at ________ in Her Majesty's ________ Regiment, submitted in accordance with No. 61 of the Revised Rules regarding measures to be adopted on outbreak of cholera.

STATION.	Corps.	Number or name of building.	Number and detail of occupants.	Date of first case.	Date of evacuation of building.	Number of cases before evacuation.	Number of cases among those occupants after evacuation.	Date of re occupation.

Surgeon in charge. *Commanding Regiment.*

Information required as to size and relative position of huts occupied by Native troops attacked by cholera.

62. When cholera has appeared among Native troops, full particulars are required as to the size and relative position of the huts of each Native regiment which suffered from the disease; the exact accommodation allotted to the several ranks should be shown, and the nature and description of the several buildings should be specified.

Report of any expense incurred for hiring bungalows, &c., to be made at once.

63. When it has been found necessary to incur any expense, such as the hiring of bungalows, &c., for the benefit of the troops during the prevalence of cholera, a special report, giving every particular, should be at once made to the Quarter Master General for the information of His Excellency the Commander-in-Chief and of the Government.

Tents are to be retained for regimental purposes only.

64. Tents belonging to a regiment are to be retained in all cases for regimental purposes, and are not to be lent to the Civil authorities for the use of prisoners in the event of epidemics breaking out in jails, or on other occasions.

Oldest and least serviceable tents to be used for cholera cases.

65. When tents are required for cholera cases among the troops, the oldest and least serviceable must be selected, provided they are fit for the purpose

Supply of camp equipage.

66. In most cases the established proportion of camp equipage will be sufficient to accommodate that portion of the garrison which it may be necessary to move into camp. Extra camp equipage should, therefore, not be indented for unless the epidemic should prove severe, and render it probable that a larger proportion than half the garrison may have to be removed from cantonments. When the necessity for this has been admitted, Commanding Officers are to indent on the nearest magazine for such additional camp equipage as they may require; the indents to be countersigned by the Deputy Inspector General of the Circle, or the senior Medical Officer on the spot, and by the Officer Commanding the Station.

Hospital management.

67. The question of hospital management during the prevalence of cholera is one of urgent importance. No sanitary precaution must for a moment be neglected; no approach to anything like crowding must be permitted; all unimportant cases, the treatment of which in hospital is not essential, should be discharged; every case in hospital must be carefully watched; and it must be borne in mind that in very numerous instances it is in the hospital, among patients under treatment for other diseases, that cholera first appears. Precautionary measures in the hospitals must be commenced, whenever it may be possible, before the actual appearance of the disease; and, as laid down in paragraph 5, all slight symptoms of disease must be treated in the barracks, or in observation wards entirely separate from the hospital.

Separate temporary hospital to be prepared for cholera cases.

68. If no separate building can be set apart as a temporary hospital, tents should be pitched for the purpose in some convenient place at a little distance. Every arrangement must be made, so that if a case of cholera should occur, it may be immediately removed there, and not be treated in the regular hospital. For the treatment of patients suffering from cholera, tents are unobjectionable at all seasons of the year. The air in a tent is less likely to become contaminated, and the ground can be changed as often as may be desirable. Medicines, and everything considered requisite for the treatment of the disease, should be prepared in the temporary hospital, and a portion of the establishment should be kept in readiness to be transferred there, so that if a case of cholera occurs, the means will exist for separate treatment, and subsequent communication with the regular hospital will be unnecessary.

Prevention of fresh cases more important than medical treatment.

69. If, in spite of every effort, the sub-division of hospital establishment should lead to difficulty in the medical treatment of the disease, this must be accepted as the lesser of two evils; for it must be always remembered that the

main object during an epidemic of cholera is the prevention of fresh cases, much more than the treatment of those who have already been attacked; that prevention is often possible, but that treatment is almost useless after virulent symptoms have appeared.

Separation of cholera patients and abandonment of hospital buildings if cholera occur in them.

70. No patient attacked by cholera should ever, under any circumstances, be placed in the same ward with patients suffering from other diseases. If a patient in hospital suffering from another disease be attacked with cholera, or if a case occur among the hospital attendants or others, the same system must be adopted as has been ordered in the event of cholera appearing in other buildings occupied by troops. The ward in which the case has shown itself must be IMMEDIATELY abandoned, and every precaution laid down with respect to other buildings must be taken.

Funeral parties.

71. During the prevalence of cholera funeral parties should be discontinued, and the band should not play at the burial either of officers or men.

Removal of cholera excreta.

72. Every effort should be made, during the actual treatment of the disease, to get rid, as completely as possible, of all the discharges from the sick or to render them innocuous. The vessels in which they are received should contain some powerful disinfectant; they should never be emptied into the usual receptacle, or carried to the common latrine, but taken away separately, and the contents thrown into a trench dug for the purpose and reserved for this use. A man should be constantly employed in the duty of throwing fresh earth over all filth the moment it is deposited, and all vessels should be thoroughly cleaned at the trench into which the filth is thrown.

Supply of extra articles of diet during prevalence of epidemics.

73. During the prevalence of cholera at a station, such changes in the diet and such other medical comforts are to be allowed to the troops as the Deputy Inspector General of the Circle or other principal Medical Officer may deem expedient. In directing these comforts to be freely supplied, particularly to the women and children, the senior Medical Officer on the spot will be required to exercise a wise discretion to avoid unnecessary expenditure, and to see that the indulgence is not abused.

Employment of Native servants in attendance on cholera patients.

74. On the occasion of an outbreak of cholera at a station, the entertainment of Natives to attend European soldiers in hospital suffering from that disease is authorized to such an extent as the local medical authorities may consider necessary—the men being provided on requisition by the Commissariat Department.

European Soldiers to be employed on Hospital duty as seldom as possible.

75. When the employment of European soldiers as orderlies in hospitals during the prevalence of cholera is considered unavoidable, men will be selected, as far as possible, by volunteering in such number as the medical authorities may deem necessary. The complete tour of duty shall in no case exceed 24 hours, and no man who is not in good health shall be thus employed. No

orderly is to be kept in actual attendance in the hospital for a longer period than four hours at one time, nor is he to have a less interval of rest than six hours between successive tours of duty, whatever be the period of attendance in the ward. A room entirely separate from the hospital buildings must be provided for the accommodation of men relieved from attendance on the sick, in which they can remain until their tour of duty again comes round. Men not upon actual duty are not to be allowed to remain in the hospital. The strictest precautions must be taken to prevent men employed in the hospital from making use of the latrines, urinaries, or wash-houses used by the sick in hospital. The utmost care must be taken that the hands of all attendants on cholera patients be scrupulously cleaned by means of sand and water containing some disinfectant, or other thoroughly efficacious means; and that if the clothes of any of the men should become soiled by cholera discharges, they be at once taken off and thoroughly purified. Every man employed as a hospital orderly in attendance upon cholera patients is to be provided with tea or coffee before and after each tour of duty.

Female nurses for attendance on women and children.

76. For attendance on women and children suffering from cholera, Native female nurses should, if possible, be procured.

Removal of the sick and of the dead.

77. Careful arrangements must be made for the removal of the sick from the barracks to the hospital, and on no account should the doolie employed for this purpose be made use of for the removal of the dead.

Purification of bedding and clothing.

78. All bedding and clothing used by cholera patients which can be subjected to this process must be immediately purified by being boiled for a quarter of an hour in water. There is no difficulty in boiling such articles as bed-tape (newar), blankets, and linen. The bug-boilers offer facilities for boiling the cots. Rezais and other such articles which can never be thoroughly cleansed should be burnt.

Purification of cots and punkah-fringes.

79. Cots and punkah-fringes which have been used by cholera patients, or in wards set apart for them, should be subjected, in a similar way, to the action of boiling water when they are no longer required for such cases.

Purification of tents.

80. Tents used by cholera patients before being struck should be disinfected by one or other of the following gaseous disinfectants,—chlorine, nitrous acid, or sulphurous acid, and then left exposed to the weather for ten days. Tents which have been used for cholera purposes in camps within cantonments should first be removed to an out-of-the-way, but airy spot outside, and then subjected to the process of fumigation.

Burning only to be resorted to when thorough purification cannot be at once carried out.

81. It will only be necessary to burn such articles as bedding, body linen, cots, and punkah-fringes when their thorough purification cannot be at once carried out in the manner above laid down, but with proper arrangements this destruction will rarely be required.

Rules applicable to women and children.

82. It is to be distinctly understood that the above rules are equally applicable to the women and children if cholera should appear in their quarters, and that they are to be as strictly carried out; but endeavours should always be made to assign available buildings to them, so that the necessity of moving them into camp may, if possible, be avoided.

Measures to be adopted on the appearance of cholera in the sudder or regimental bazaar.

83. On the appearance of cholera or any other epidemic in the sudder or regimental bazaar of a station, arrangements should be made for the isolation and treatment of the cases. One or more grass huts should be placed on the outskirts of cantonments in a convenient and selected position, a fresh site being selected weekly, as the ground becomes contaminated and proves a source of danger. Stringent orders should be issued to ensure all cases of the disease being sent to this isolated hospital for treatment.

Station Staff Surgeon to have charge of the Hospitals for Natives.

84. The hospital will be under the medical charge of the Station Staff Surgeon, or other Medical Officer selected by the Deputy Inspector General of Hospitals, and the establishment, as per margin, to be increased if necessary, will be attached to it—the servants to be discharged on the subsidence of the epidemic.

1 Native Doctor.
1 Compounder.
1 Cook.
1 Bheesty.
2 Sweepers.
1 Doolie with 4 bearers.

Expenses to be defrayed from Cantonment Funds.

85. When cantonment funds can be made available, without withdrawing them from such measures of conservancy as may be considered of even more importance, all expenses incurred by the establishment of these temporary hospitals, including the dieting of the patients, if that be also involved, should be defrayed by them, the primary object of such funds being to secure the proper sanitary condition of a station in every possible way.

Record of buildings and camps in which cholera occurs.

86. As experience in such matters is of great value, a careful record should be preserved in the Brigade or Station Staff Office showing the number of cases occurring in each building, and the number of attacks in the different camps.

SECTION III.

OTHER POINTS REQUIRING THE SPECIAL ATTENTION OF MEDICAL OFFICERS.

Investigation into the circumstances of the first case.

87. In any epidemic, it is of the greatest importance to ascertain all the circumstances connected with the appearance of the first case, and a very careful investigation should be made at once in order to discover, if possible, whether it was due to importation. Such enquiries if delayed are usually unsatisfactory.

Condition of camp-followers.

88. The condition of the camp-followers, of the punkah coolies, and others who come about the barracks should receive attention, and orders should

be issued that any suspicious cases occurring among them be reported, so that they may be at once investigated. With the assistance of the Non-Commissioned Officers, such cases of sickness should not escape detection. Arrangements should be made for the early treatment of those attacked either in camp or cantonments, and where the general cholera hospital for natives is distant, measures should be adopted for attending to their wants on the spot. A careful note of all such seizures and of the circumstances under which they occur should be preserved.

Abolition of the term "choleraic diarrhœa."

89. In the forms now adopted the term "choleraic diarrhœa" has been abolished. All such cases distinguished by rice-water evacuations should be returned as cholera.

Disuse of the words "sporadic" and "epidemic."

90. It is very desirable that the terms "sporadic" and "epidemic" should not be used in connection with reports of cases of cholera. There are no means of distinguishing between the two, and the exact significance of individual attacks can be known only when all the facts regarding the prevalence of the disease throughout the year have been ascertained and considered as a whole.

Cholera cases not to be returned as "discharged" until all symptoms of the disease have disappeared.

91. In some instances, cases of cholera in which reaction has taken place have been discharged, and the fatal event which afterwards occurred recorded under the head of fever. This system produces great error in the statistics, and it ought on no account to be followed. No cases of cholera should be "discharged" until every symptom either directly or indirectly due to the disease has disappeared.

A lull in the number of cases not to lead to any relaxation of precautionary measures.

92. When no cases of cholera have occurred for several days, an opinion is apt to prevail that the disease has disappeared, but it must be remembered that at certain seasons a lull is to be expected. This generally occurs in the early part of the monsoon. With regard to it no decided rule can yet be laid down, but it is important that the fact of there having been no cases for some time should not lead to any relaxation of the necessary precautions and preparations in anticipation of a further and generally more severe outbreak.

Effect of upper stories on proportion of attacks.

93. As it is important to ascertain the effect of upper stories in warding off attacks, a daily register in the annexed form should be kept:—

DATE.	Number occupying upper stories on that date.	Number of attacks in upper stories on that day.	Number occupying lower stories on that date.	Number of attacks in lower stories on that day.	REMARKS.*

* In the remarks, the case of any man lately on guard, or particulars regarding other influences which may have caused the attack, should be noted.

SECTION IV.

RESPONSIBILITY OF COMMANDING OFFICERS.

The Rules to be carried out by the Officer Commanding the Station.

94. On the Officer Commanding the Station will devolve the responsibility of having all the directions contained in these rules, as regards the evacuation and purification of buildings, the movements into camp, and all other details, carefully carried out.

Discretionary powers of Officers in Command.

95. These rules, founded on the general experience of the past, must be considered as the guide on all ordinary occasions. As in outbreaks of cholera, however, so much depends on the judgment and action of general and other Officers, they must exercise their own discretion whenever extraordinary emergencies or unforeseen circumstances occur, and, in consultation with the senior Medical Officer, must take upon themselves the responsibility of action incumbent on their position.

Whenever it may be considered advisable to deviate from the procedure prescribed in these rules, a special report, explaining fully the reasons for so doing, must be forwarded to the Quarter Master General for the information of the Commander-in-Chief.

SECTION V.

Rules regarding the measures to be adopted on the appearance of Small-pox among British or Native troops.

I.—Whenever a case of small-pox appears among either British or Native troops, it should be immediately isolated, and all communication between the sick person and others, whether direct or indirect, should, as far as possible, be prevented.

II.—In some cantonments a building, no longer required for other purposes, and occupying an unfrequented site, has been set apart for the reception of small-pox cases, and whenever such a building is available, the case should be at once removed to it.

III.—In those cantonments where no such building exists, the case must be removed either to a tent or to a grass hut.

IV.—As cases are most apt to occur in the hot months, a grass hut is in every way better suited for the purpose than a tent. If lined on the sides with a coating of mud, it affords very good protection.

V.—If, owing to the small number of sick in hospital, or to other circumstances, a ward or other room, well separated from the other patients or other persons, can be made available for the temporary reception of the case, there is no objection to its being treated there during the first day or two of the disease when the eruption is still advancing, and its power of spreading to a distance is comparatively limited. Time will thus be allowed for the preparation of a grass hut.

VI.—If this course should have been followed, the room temporarily occupied by the case should be immediately purified in the manner described in Rule 32 regarding cholera.

VII.—Whether a tent or grass hut is employed, it should be pitched in some secluded spot, and the shelter of trees, if possible, secured.

VIII.—If a tent is used, the oldest and least serviceable should be selected.

IX.—Good tents should never be employed for the purpose, except in very exceptional cases, which should in each instance be explained.

X.—Unless there is an immediate prospect of their being further required, tents or huts used by small-pox patients should be destroyed by fire, in presence of a responsible person, as soon as vacated.

XI.—If there is an immediate prospect of the tent or hut being again required, it should be purified in the manner described as suitable for buildings in Rule 32 for cholera. It should then be left standing with the sides and doors kept closely shut down.

XII.—Bedding and clothing, cots and punkah-fringes, should be thoroughly disinfected as described in Nos. 78, 79, and 81 for cholera.

APPENDIX A.

Directions to be observed in despatching Telegraphic Messages regarding Cholera.

I.—The message should usually be despatched soon after 8 A. M. so as to agree with the morning state, Form No. 1, required by Rule No. 58.

II.—The number of cases and deaths among men, women, and children in each regiment of Europeans at the station during the preceding 24 hours should be stated separately.

III.—The number of cases and deaths in each Native regiment should also be stated.

IV.—Particulars regarding camp-followers or the city and bazaars should be given only when they are important, as indicating the advance or decline of the disease.

V.—All particulars regarding movement of troops should be included in the message, and the condition of each detachment in camp.

VI.—When there is no Telegraph Station in or near the cantonment attacked, the message should be sent by post to the nearest Telegraph Station.*

VII.—The following specimens of telegrams are appended for guidance :—

From—Allahabad. | To—Army Head Quarters.
From—Officer Commanding. | To—Quarter Master General.

22nd March, one case, 58th Regiment, a soldier. Building vacated and disinfected.

25th March, twelve admissions from British and five from Native troops since yesterday's report. All soldiers.
Artillery, three in cantonment.
Artillery, one in fort.
No deaths.

58th Regiment, eight in new barracks, six deaths. Two companies moved to Camp Jhosee. Affected building vacated. Reports from city and district more favorable.

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* As in such stations Telegraph Stamps are not generally procurable, Officers are required to adopt the procedure set forth in Notification dated, Calcutta, 22nd December 1868, paragraph 3, General Order dated 18th January 1869, namely :—

"*Para.* 3. -Telegrams can be sent from out-stations by post, but they must be enclosed in registered covers; at stations where Telegraph Stamps are not procurable, they may be paid for by Postage Stamps at the rate of 17 annas to the Rupee. In such cases the Post Office registration receipt will take the place of the ordinary Telegraph receipt. If any telegram be received insufficiently stamped, it will be returned bearing to the sender."

ANNUAL RETURNS

OF THE

EUROPEAN AND NATIVE ARMIES

AND OF THE

JAIL POPULATION OF THE BENGAL PRESIDENCY

FOR THE YEAR 1869.

COMPILED AND SYSTEMATICALLY ARRANGED FROM THE ORIGINAL DOCUMENTS BY

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1869.

1.—EUROPEAN TROOPS ... ... Tables I—XXIII.
2.—NATIVE ARMY ... ... „ I—XV.
3.—JAIL POPULATION ... ... „ I—XII.
4.—DETAIL of the ADMISSIONS and DEATHS of the EUROPEAN and NATIVE ARMIES, and of the JAIL POPULATION.

EUROPEAN TROOPS, 1869.

EUROPEAN TROOPS, 1869.

I.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the BENGAL PRESIDENCY during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	33,325	1,529	4·59	38	...	.	3	...	2	1	...	...	2	...	7	..	4	5	3	1	...	...	1	4	5
February ...	34,138	1,590	4·66	40	...	1	3	.	2	4	...	...	2	...	9		3	3	5	...	...	1	1	5	1
March ..	35,458	1,645	4·64	52	...	19	2	...	...	1	1	1	2	..	6	...	2	3	2	.	..		...	4	9
April ...	35,704	1,747	4·80	88	...	30	2	1	5	6	2	1	5	. .	10		1	5	5	. .	...	1	1	5	8
May ...	35,527	2,041	5·74	129	...	44	2	...	4	10	32	3	4	. .	9	...	3	7	5	..	...	...	1	4	1
June ...	35,424	2,158	6·09	133	...	15	1	...	2	11	50	6	4	1	14	...	3	6	8	...	..	..	1	9	3
July ...	35,244	2,165	6·14	84	...	17	1	1	5	8	8	1	9	1	10		1	3	10	.	...	1	1	3	4
August ...	35,008	2,312	6·60	317	...	198	2	3	12	11	23	3	19	6	17	1	2	5	6	1	..	...	.	5	3
September ..	34,086	2,619	7·65	321	. .	215	...	1	18	9	8	4	15	..	23	...	1	3	13	...	...	...		6	5
October ...	34,364	2,683	7·81	113	...	24	...	3	11	5	4	1	17	2	26	..	2	7	3	.	.		...	4	1
November ...	33,333	2,400	7·20	116	...	2	...	3	10	4	3	1	19	1	28	. .	2	6	10	1	.	5	...	16	5
December ...	33,272	1,833	5·51	51	...	5	...	1	7	2	...	1	14	...	12	1	...	3	3	. .	.	...	.	3	2
						570	16	13	78	72	131	22	112	11	171	2	24	56	73	3		8	6	68	50
						Died per 1,000 of the Average Strength.																			
For the year ...	34,624	2,060	5·95	1,485	42·89	16·46	·46	4·71			3·78	·64	3·23	·32	4·94	·06	·69	1·59	2·11	·09	..	·23	·17	1·96	1·45

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month. Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admissions during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
Cholera ...	...	2	29	52	64	24	31	320	337	20	5	5	889	2·57	63·55
Smallpox	30	31	38	13	11	3	. .	2	...	...	...	2	130	·38	12·31
Fever, Intermittent .	426	329	451	491	556	711	567	1,186	2,116	3,802	4,942	1,916	17,529	50·63	·08
„ Remittent ...	26	29	62	108	201	270	167	350	216	174	172	41	1,865	24·40	1·73
„ Continued ..	56	65	114	318	1,080	1,138	859	1,248	688	624	308	66	6,594		
Apoplexy ...	...	..	2	7	54	110	23	40	10	2	7	...	261	·75	48·08
Delirium Tremens ...	15	8	13	18	23	33	20	21	22	21	18	11	223	·64	9·41
Dysentery ..	73	56	69	110	104	102	118	275	261	187	102	88	1,053	4·71	6·73
Diarrhœa ...	106	91	151	252	276	294	307	861	465	250	190	151	3,403	9·83	·32
Hepatitis ..	113	83	129	126	154	198	166	212	200	146	173	115	1,815	5·24	9·25
Spleen Disease ...	6	7	14	5	20	11	17	11	16	10	10	12	139	·40	1·44
Respiratory Diseases .	238	108	226	164	221	221	144	201	150	155	186	178	2,282	6·59	1·01
Phthisis Pulmonalis ...	28	17	25	31	37	56	42	59	48	31	31	25	430	1·24	16·74
Scurvy ..	3		7	5	3	5	6	3	3	5	1	...	44	·13	...
Rheumatism ...	170	174	224	183	170	202	213	241	160	182	176	111	2,259	6·52	·61
Venereal Diseases ...	727	694	824	604	543	537	405	489	459	471	654	527	6,934	20·03	
Eye Diseases ...	53	53	81	76	76	83	56	119	96	72	82	56	903	2·61	
Abscess and Ulcer ...	212	257	255	276	238	390	341	303	270	217	246	201	3,275	9·46	
Wounds and Accidents ..	281	266	401	208	286	251	233	243	105	217	241	258	3,173	9·17	
All other Causes ...	388	363	617	480	544	709	555	711	601	400	471	270	6,111	17·65	
	2,951	2,723	3,028	3,080	4,661	5,399	4,270	6,988	6,303	7,055	8,070	4,094	59,882		
	Admitted per cent. of the Average Strength in each Month.														
	8·85	7·98	10·23	10·31	13·12	15·24	12·12	19·96	18·34	20·53	24·21	12·30	172·95		

EUROPEAN TROOPS, 1869.

II.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in BENGAL PROPER during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																			Died out of Hospital.
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	
January ...	1,297	71	5·48	5	...	..	...	...		...		..	..		3			.	1	...	...	...	1	...	...
February ...	1,425	68	4·77	4	...	..	...	...	..	...	...	..	.	...	2	.	...	1	...	..	...	...	...	1	...
March ...	2,077	89	4·28	5	...	..	...	...	..	...	.	1	..	...	1	...	...	...	1	...	...	...	...	...	2
April ...	2,062	93	4·51	3	...	1	...	...	..	1	...	...	...	...	1	...	.	...	.	...	...	..	...	..	...
May ...	2,060	110	5·34	10	...	...	...	...	.	..	5	1	1	..	1	..	...	1	1	...	...	...	...	...	...
June ...	2,041	121	5·92	6	...	...	...	...	..	..	5	...	1	...	..	...	...	...	...	...	...	...	...	...	..
July ..	2,034	121	5·95	4	...	...	...	...	..	..	.	1	...	...	...	...	1	..	...	...	...	...	...	1	1
August .	2,020	133	6·58	10	...	...	...	1	1	..	1	1	1	1	2	...	1	...	1	..	...	...	...	...	...
September ...	1,985	139	7·00	7	...	...	...	1	...	1	...	1	...	...	2	...	...	...	1	...	...	...	..	..	1
October ...	1,913	121	6·32	2	..	.	...	...	...	...	...	1	...	...	..	...	...	...	...	...	..	...	..	1	...
November .	1,930	84	4·34	3	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	.	...	1
December ...	1,978	93	4·70	3	...	...	...	...	..	..	...	...	2	...	1	..	...	...	...	...	...	.	..	..	.
						1	...	2	2	2	11	6	6	1	13	...	2	2	5	...	..	..	1	3	5
						Died per 1,000 of the Average Strength.																			
For the year ...	1,903	104	5·47	62	32·58	·53	...	3·15			5·78	3·15	3·15	·53	6·83	...	1·05	1·05	2·63	...	..	...	·53	1·57	2·63

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admissions during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
	Jan	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera .	...	...	...	1	1	...	...	..	1	..	...	...	3	·16	33·33
Smallpox	.	1	2	...	..	..	...	..	...	.	...	...	3	·16	..
Fever, Intermittent .	35	26	23	27	23	30	31	35	32	27	20	15	324	17·03	·61
" Remittent .	.	...	1	..	1	...	1	4	4	2	...	.	13	13·08	
" Continued .	1	.	8	14	31	50	26	31	23	20	14	9	230		1·61
Apoplexy ..	...	...	...	...	8	9	...	2	...	..	.		19	1·00	57·89
Delirium Tremens	2	2	3	3	5	4	1	4	4	5	3	1	37	1·94	16·22
Dysentery	2	2	3	4	7	6	5	21	15	9	12	12	98	5·15	6·12
Diarrhœa ..	4	8	20	6	3	2	10	18	7	6	5	7	96	5·05	1·04
Hepatitis .	2	6	2	5	6	7	9	14	12	9	11	10	93	4·89	13·98
Spleen Disease .	...	..	...	...	.	.	1	...	1	1		.	3	·16	..
Respiratory Diseases ..	3	4	8	6	3	7	5	8	4	15	8	12	83	4·36	2·41
Phthisis Pulmonalis ..	...	...	2	1	2	..	...	3	..	1	1	.	10	·53	50·00
Scurvy	...	..	1	...	1	1	.		.		.	..	3	·16	...
Rheumatism ...	2	3	8	2	3	5	9	10	12	5	6	12	86	4·52	·48
Venereal Diseases ..	37	39	44	42	36	36	28	30	38	29	38	23	420	22·07	
Eye Diseases ..	4	...	5	8	3	2	2	1	4	5	3	1	41	2·15	
Abscess and Ulcer	6	10	11	9	8	19	19	18	18	15	23	14	170	8·93	
Wounds and Accidents .	5	10	21	13	8	15	12	27	29	18	20	16	189	9·93	
All other Causes .	8	13	38	29	33	39	36	54	30	32	13	14	339	17·81	
	111	124	200	170	182	241	195	292	231	194	177	146	2,266		
	Admitted per cent. of the Average Strength in each Month.														
	8·56	8·70	9·63	8·21	8·84	11·79	9·59	14·46	11·79	10·13	9·14	7·38	119·08		

EUROPEAN TROOPS, 1869.

III.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the DINAPORE, BENARES, OUDE and CAWNPORE DISTRICTS during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS IN HOSPITAL.																			
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	8,225	372	4·52	9	...	...	...	...	1	...	...	...	...	...	1	..	1	2	.	1		.	...	2	1
February ...	8,831	450	5·09	5	...	...	...	...	...	1	...	...	...	...	2	..	..	...	1	.	..	..		1	..
March ...	8,851	479	5·41	27	...	18	...	...	...	...	1	...	...	...	1	...	1	1					.	2	3
April ...	8,693	489	5·63	25	...	6	2	...	3	4	2	...	1	.	2	...	...	3	...		...		...	2	
May ...	8,661	490	5·66	51	...	16	2	...	3	3	17	1	2	...	1	...	1	2	2	...			...	1	...
June ...	8,644	542	6·27	41	...	13	...	...	2	2	10	2	...	.	6	...	2	1	1	...			1	1	...
July ...	8,567	493	5·75	25	...	14	...	...	...	2	...	...	3	1	1	..	...	...	4	...	.	..	.	...	1
August ...	8,467	561	6·63	154	...	114	...	...	3	5	7	1	8	4	5	1	1	2	1	...			...	1	1
September ...	8,398	649	7·73	31	...	4	...	...	8	3	1	1	5	..	6	...	..	.	2	.	...			1	..
October ...	8,332	619	7·43	25	...	...	...	...	1	1	1	...	5	..	10		2	3	1	.	.		.	.	1
November ...	6,952	495	7·12	21	...	...	...	..	...	...	1	...	5	...	8	..	...	1	3	...			.	1	2
December ...	7,073	424	5·99	11	...	1	...	...	...	1	...	...	3	...	2	...	...	...	1	...		.	...	1	2
						186	4	...	21	22	40	5	32	5	44	1	8	15	16	1	..		1	13	11
						Died per 1,000 of the Average Strength.																			
For the year ...	8,308	505	6·08	425	51·16	22·39	·48	5·18			4·82	·60	3·85	·60	5·30	·12	·96	1·81	1·93	·12	...	.	·12	1·56	1·32

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	...	1	27	12	20	17	26	149	2	..	..	1	255	3·07	72·94
Smallpox	..	7	6	7	7	1	...	...	..	.		1	29	·35	13·79
Fever, Intermittent ...	31	48	89	85	65	92	49	82	99	203	254	86	1,183	14·24	..
„ Remittent ...	10	5	20	41	60	87	29	69	71	32	39	13	479	21·86	2·37
„ Continued ...	16	21	43	97	116	342	156	197	149	117	67	16	1,337		
Apoplexy	...	...	2	4	29	34	1	7	2	...	.	.	79	·95	50·63
Delirium Tremens ...	6	1	5	3	3	8	1	5	5	5	4	3	48	·58	10·42
Dysentery	26	24	29	33	11	22	41	91	87	53	12	25	484	5·82	6·61
Diarrhœa	32	34	50	63	53	63	104	318	105	39	40	20	941	11·33	·53
Hepatitis	26	23	38	30	35	37	20	57	57	37	48	37	460	5·54	9·57
Spleen Disease ...	1	..	3	2	4	1	1	...	..	2	1	.	15	·18	6·67
Respiratory Diseases ...	45	85	61	32	49	30	37	39	18	36	[illegible]	24	467	5·62	1·71
Phthisis Pulmonalis ...	4	2	5	7	8	15	8	8	19	6	9	3	94	1·13	17·02
Scurvy	..		2	...	1	1	...	...	2	4			10	·12	...
Rheumatism ...	35	35	58	35	44	51	18	53	48	64	11	31	532	6·40	·49
Venereal Diseases ...	255	251	280	151	135	148	112	138	160	178	220	172	2,207	26·56	
Eye Diseases ...	10	23	28	20	16	23	23	31	32	21	16	11	257	3·09	
Abscess and Ulcer ...	47	49	83	55	46	81	87	81	79	60	86	46	832	10·02	
Wounds and Accidents ..	89	80	112	68	58	52	45	46	39	69	57	40	745	8·97	
All other Causes ...	89	105	112	108	144	170	120	169	189	111	110	66	1,541	18·55	
	723	744	1,086	849	904	1,312	917	1,576	1,185	1,026	1,079	595	11,995		
	Admitted per cent. of the Average Strength in each Month.														
	8·78	8·42	12·27	9·77	10·43	15·18	10·70	18·61	14·11	12·31	15·52	8·41	144·38		

EUROPEAN TROOPS, 1869.

IV.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the MEERUT and ROHILCUND DISTRICTS during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																			
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ..	4,443	281	6·32	5	...	...	...	...	...	..	...	...	1	...	1	...	1	...	...	...	...	...	...	1	1
February ...	4,761	296	6·22	5	..	...	...	...	1	...	...	...	1	...	1	...	...	1	...	...	...	...	...	1	...
March ...	4,776	243	5·09	3	...	...	...	...	...	...	..	..	...	...	1	...	..	...	...	...	...	...	...	1	1
April ...	5,070	277	5·46	11	...	...	...	.	..	1	...	...	4	...	4	...	...	...	...	...	...	...	...	1	1
May ...	5,858	372	6·35	10	...	...	...	...	1	3	...	...	1	.	3	...	...	2	...	...	...	...	..	...	...
June ...	5,827	399	6·85	21	...	...	1	...	...	2	9	2	...	...	3	...	...	...	1	...	...	...	...	3	...
July ...	5,808	431	7·42	12	...	...	...	...	..	1	...	..	4	...	2	...	..	1	2	...	...	...	...	...	2
August ...	5,798	437	7·54	10	...	...	...	...	1	...	2	1	1	...	...	...	...	...	1	1	...	...	...	2	1
September ...	5,774	430	7·45	19	..	5		...	...	...	...	1	3	...	3	...	1	2	2	...	...	...	...	1	1
October ...	5,705	399	7·00	14	...	4	...	...	3	1	...	...	2	...	3	...	...	1	...	...	...	...	...	...	...
November ...	4,700	325	6·91	15	..	1	...	...	2	...	..	1	3	...	4	...	...	...	1	...	...	...	...	3	...
December ...	4,459	226	5·07	9	...	...	...	.	2	...	...	1	2	...	3	...	...	...	1	...	...	...	..	...	...
						10	1	...	10	8	11	6	22	...	28	...	2	7	8	1	...	...	..	13	7
						Died per 1,000 of the Average Strength.																			
For the year ...	5,249	343	6·54	134	25·53	1·91	·19	3·43			2·10	1·14	4·19	...	5·34	...	·38	1·33	1·52	·19	...	..	...	2·48	1·33

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admissions during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	..	.	1	1	...	...	...	...	8	4	3	...	17	·32	58·82
Smallpox ...	2	2	2	..	2	1	...	..	...	...	...	...	9	·17	11·11
Fever, Intermittent ..	64	50	58	72	106	125	108	181	167	200	317	93	1,541	29·36	..
„ Remittent ...	2	8	9	46	55	58	27	50	34	34	18	10	351	13·01	2·63
„ Continued ..	9	4	7	30	41	62	52	40	27	29	21	10	332		
Apoplexy ...	.	...	..	1	..	27	...	3	1	...	...	..	32	·61	34·37
Delirium Tremens ..	2	1	1	1	1	5	4	5	3	3	5	1	32	·61	18·75
Dysentery ...	10	13	12	29	23	19	18	49	44	36	48	6	312	5·94	7·05
Diarrhœa ..	7	4	7	36	27	32	20	78	69	59	22	14	381	7·26	...
Hepatitis .	19	18	29	31	42	49	44	51	42	30	32	17	404	7·69	6·93
Spleen Disease ...	...	1	2	1	6	7	5	5	3	2	1	1	34	·65	..
Respiratory Diseases ..	30	26	22	18	20	37	33	36	34	21	30	19	326	6·21	·61
Phthisis Pulmonalis ...	3	5	2	8	12	18	10	21	9	4	1	6	99	1·89	8·08
Scurvy ...	...	...	..	...	1	1	1	1	..	...	...	...	4	·08	...
Rheumatism ...	23	23	27	13	17	24	36	31	33	26	27	9	289	5·51	·62
Venereal Diseases ...	112	106	84	122	96	87	79	108	80	83	85	72	1,114	21·22	
Eye Diseases ...	4	1	6	13	19	8	5	22	15	7	6	1	107	2·04	
Abscess and Ulcer ..	40	38	30	51	47	60	56	71	40	25	34	19	520	9·91	
Wounds and Accidents ..	38	28	49	37	42	37	44	42	34	25	36	41	453	8·63	
All other Causes	46	37	51	89	88	106	101	127	103	70	56	31	905	17·24	
	417	365	399	599	645	772	649	921	746	657	742	350	7,262		
	Admitted per cent. of the Average Strength in each Month.														
	9·39	7·67	8·36	11·81	11·01	13·25	11·18	15·89	12·92	11·52	15·77	7·85	138·35		

EUROPEAN TROOPS, 1869.

V.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the AGRA DISTRICT and in CENTRAL INDIA during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																			Died out of Hospital.
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	
January ...	4,735	241	5·09	4	...	...	2	...	..	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1
February ...	4,779	228	4·77	8	...	...	3	...	1	...	...	...	...	...	1	...	...	...	1	..	...	...	...	1	1
March ...	4,608	253	5·49	5	...	1	2	...	...	...	...	...	1	...	...	...	...	. .	...	...	...	...	...	...	1
April ...	4,526	251	5·55	28	...	23	...	1	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	2
May ...	4,477	243	5·43	40	...	27	...	..	...	...	9	1	...	...	1	..	...	...	1	...	...	...	...	1	...
June ...	4,440	241	5·43	30	...	2	...	...	...	1	18	1	...	1	1	...	...	2	1	...	...	...	...	2	1
July ...	4,425	213	4·81	8	. .	3	...	...	2	...	...	...	...	...	1	...	...	1	1	...	...	..	...	...	...
August ...	4,377	277	6·33	80	...	66	...	...	3	1	5	...	1	...	2	...	...	1	...	...	...	...	...	1	...
September .	4,322	359	8·31	29	. .	10	..	...	2	. .	...	...	5	..	6	...	...	...	3	...	...	...	...	2	1
October ...	4,291	446	10·39	18	...	. .	...	2	1	1	...	...	4	1	6	. .	...	2	...	...	...	...	...	. .	1
November .	4,074	387	9·50	25	...	...	...	...	1	1	2	...	6	...	8	...	1	1	...	...	...	1	...	4	...
December ...	3,437	253	7·36	7	...	...	...	...	2	...	...	...	4	...	...	. .	...	1	...	...	...	...	...	...	...
						132	7	3	13	4	34	3	21	2	26	...	1	9	7	...	...	1	...	11	8
						Died per 1,000 of the Average Strength.																			
For the year ...	4,374	283	6·47	282	64·47	30·18	1·60	4·57			7·77	·69	4·80	·46	5·94	...	·23	2·06	1·60	...	...	·23	...	2·51	1·83

CAUSES OF ADMISSIONS	Numbers of Admissions into Hospital in each Month.												Total Admissions during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera . .	..	..	1	38	42	6	5	143	10	...	...	...	245	5·60	53·88*
Smallpox ..	16	15	20	3	2	.	...	..	..	...	...	...	56	1·28	12·50
Fever, Intermittent ...	95	65	114	131	118	172	67	170	436	935	1,063	322	3,688	84·32	·08
,, Remittent .	2	3	1	4	6	5	3	12	13	12	10	3	74	16·59	2·34
,, Continued .	10	5	3	29	40	114	74	190	82	62	34	9	652		
Apoplexy .. .	.	. . .	..	1	9	30	1	5	1	1	2	...	50	1·14	68·00
Delirium Tremens	. .	2	...	5	4	2	5	2	3	1	2		26	·59	11·54
Dysentery	9	5	8	5	10	8	18	44	53	36	32	7	235	5·37	8·94
Diarrhœa	17	7	21	40	56	50	53	180	65	25	22	22	558	12·76	·36
Hepatitis	14	12	13	12	13	18	13	18	31	18	22	7	191	4·37	13·61
Spleen Disease ...	2	3	...	...	...	...	2	...	3	2	5	4	21	·48	
Respiratory Diseases . .	51	20	23	16	18	13	7	17	16	16	22	18	237	5·42	·42
Phthisis Pulmonalis ...	3	2	4	2	5	2	5	6	11	1	2	2	45	1·03	15·55
Scurvy .	...	...	..	...	...	.	...	1	...	.	1	...	2	·05	...
Rheumatism . .	25	24	21	19	20	11	11	20	17	16	18	12	214	4·89	·72
Venereal Diseases ...	123	100	152	84	76	79	74	78	90	83	109	49	1,097	25·08	
Eye Diseases ...	2	7	5	7	2	4	5	18	12	11	15	23	111	2·54	
Abscess and Ulcer ...	41	34	30	40	31	60	46	23	26	16	16	17	380	8·69	
Wounds and Accidents...	54	38	65	41	55	30	32	30	17	21	26	20	429	9·81	
All other Causes ...	56	44	55	55	71	77	52	84	53	57	59	36	699	15·98	
	520	386	536	532	578	681	473	1,041	939	1,313	1,460	551	9,010		
	Admitted per cent. of the Average Strength in each Month.														
	10·98	8·08	11·63	11·75	12·91	15·34	10·69	23·78	21·73	30·60	35·84	16·03	205·99		

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* The death-rate for Cholera for this province is diminished in consequence of the lowness of the death-rate of Jhansi; for this station six deaths only are recorded out of fifty-four admissions from Cholera.

EUROPEAN TROOPS, 1869.

VI.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the PUNJAB during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS IN HOSPITAL. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	13,067	476	3·65	12	...	...	1	...	1	1	...	...	...	...	1	...	2	2	2	...	...	...	...	1	1
February ...	13,816	509	3·68	14	...	...	...	...	...	3	...	...	...	...	3	...	3	1	3	...	...	...	...	1	...
March ...	14,051	535	3·81	8	...	...	...	...	...	1	...	...	1	...	1	...	1	1	...	...	...	...	...	1	2
April ..	14,356	595	4·14	17	...	...	...	...	1	...	...	...	...	...	3	...	1	1	3	...	...	1	1	2	4
May ...	14,445	824	5·70	18	...	1	...	...	...	4	1	...	...	...	3	...	2	2	1	...	...	...	1	2	1
June ...	14,448	852	5·90	31	...	...	...	...	...	6	5	1	3	...	5	...	1	2	5	...	...	...	...	3	...
July ...	14,391	904	6·28	34	...	...	1	1	3	5	8	...	2	...	5	...	...	1	3	...	...	1	1	2	1
August ...	14,328	902	6·30	63	...	18	2	2	4	5	8	...	8	1	8	...	...	2	3	...	...	...	...	1	1
September ...	14,190	1,039	7·32	235	...	196	...	...	8	5	7	1	2	...	6	...	...	1	5	...	...	...	...	2	2
October ...	14,055	1,089	7·75	53	...	20	...	1	6	2	3	...	6	1	7	...	...	1	2	...	...	...	...	3	1
November ...	13,168	1,029	7·81	48	...	1	...	3	6	3	...	...	3	1	8	...	1	4	4	1	...	4	...	8	1
December ...	13,359	736	5·51	13	...	...	...	1	1	1	...	...	3	...	4	...	..	2	...	...	...	...	...	1	...
						236	4	8	30	36	32	2	28	3	54	...	11	20	31	1	...	6	3	27	14
						Died per 1,000 of the Average Strength.																			
For the year ...	13,998	791	5·65	546	39·01	16·86	·28	5·28			2·29	·14	2·00	·22	3·86	...	·79	1·43	2·22	·07	...	·43	·22	1·93	1·00

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH. Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admissions during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
Cholera	...	...	...	...	1	1	...	28	316	16	2	...	364	2·60	64·84
Smallpox	12	6	7	3	...	1	...	2	...	...	...	1	32	·23	12·50
Fever, Intermittent ...	196	130	161	172	244	321	312	718	1,382	2,434	3,237	1,308	10,615	75·83	·08
„ Remittent ...	12	18	20	72	79	120	107	216	121	93	53	15	926	35·20	1·34
„ Continued ...	17	35	53	140	852	561	551	790	407	396	162	32	4,002		
Apoplexy	...	...	...	1	8	15	20	23	6	1	1	...	75	·54	42·67
Delirium Tremens ...	4	1	4	6	10	14	9	6	7	7	4	5	76	·54	2·63
Dysentery	12	11	14	33	53	47	36	70	62	51	47	22	458	3·27	6·11
Diarrhœa	37	35	43	105	136	147	114	237	229	121	90	71	1,365	9·75	·22
Hepatitis	32	20	37	41	58	86	70	72	58	51	55	39	619	4·42	8·72
Spleen Disease ...	2	3	8	2	10	3	8	6	9	3	2	4	60	·43	...
Respiratory Diseases ...	103	106	104	88	131	134	62	100	48	66	87	94	1,123	8·02	·98
Phthisis Pulmonalis ...	5	5	11	12	10	21	19	21	9	18	16	6	153	1·10	20·26
Scurvy	2	...	3	5	...	2	5	1	1	1	...	...	20	·14	...
Rheumatism ...	71	86	108	101	86	111	109	121	70	79	73	65	1,080	7·72	·07
Venereal Diseases ...	176	183	230	196	200	189	113	135	91	96	156	163	1,927	13·77	
Eye Diseases ..	30	21	31	27	36	46	21	41	33	27	21	18	352	2·51	
Abscess and Ulcer ...	75	112	96	116	106	139	133	167	107	100	79	86	1,316	9·40	
Wounds and Accidents...	88	107	148	146	129	117	100	98	76	80	76	122	1,290	9·22	
All other Causes ...	141	152	214	186	207	308	214	306	226	180	207	106	2,485	17·75	
	1,009	1,032	1,292	1,458	2,350	2,389	2,082	3,150	3,258	3,838	4,368	2,150	28,338		
	Admitted per cent. of the Average Strength in each Month.														
	7·72	7·47	9·19	10·16	16·27	16·53	14·12	22·03	22·96	27·31	32·43	16·14	202·44		

VII.

COMPARATIVE STATEMENT of the RATIOS of SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the various PROVINCES of the BENGAL PRESIDENCY during the Year 1869.

DISEASES.	BENGAL PROPER. Average Strength ... 1,903 Daily Sick per cent. of Strength ... 5·47 Admitted per cent. of Strength ... 119·08		DINAPORE, BENARES, OUDE, AND CAWNPORE. Average Strength ... 8,309 Daily Sick per cent. of Strength ... 6·08 Admitted per cent. of Strength ... 144·38		MEERUT AND ROHILCUND. Average Strength ... 5,219 Daily Sick per cent. of Strength ... 6·54 Admitted per cent. of Strength ... 138·35		AGRA AND CENTRAL INDIA. Average Strength ... 4,374 Daily Sick per cent. of Strength ... 6·47 Admitted per cent. of Strength ... 205·99		PUNJAB. Average Strength ... 13,898 Daily Sick per cent. of Strength ... 5·65 Admitted per cent. of Strength ... 202·44		BENGAL PRESIDENCY. Average Strength ... 34,624 Daily Sick per cent. of Strength ... 5·95 Admitted per cent. of Strength ... 172·95	
	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.
Cholera ...	·16	33·33	3·07	72·94	·32	58·82	5·60	53·58*	2·60	64·84	2·57	63·55
Smallpox ...	·16	...	·35	13·79	·17	11·11	1·28	12·50	·23	12·50	·38	12·31
Fever, Intermittent	17·03	·61	14·24	...	29·36	...	84·32	·08	75·83	·08	50·63	·08
Fever, Remittent and Continued	13·08	1·61	21·86	2·37	13·02	2·03	16·59	2·34	35·20	1·34	21·40	1·73
Apoplexy ...	1·00	57·89	·95	50·83	·61	34·17	1·14	68·00	·54	42·67	·75	48·08
Delirium Tremens	1·94	16·22	·58	10·42	·61	18·75	·59	11·54	·54	2·83	·64	9·41
Dysentery ...	5·17	6·12	5·82	6·61	5·94	7·05	5·37	8·94	3·27	6·11	4·71	6·73
Diarrhœa ...	5·05	1·04	11·33	·53	7·26	...	12·76	·36	9·75	·22	9·83	·32
Hepatitis ...	4·89	13·98	5·51	9·57	7·69	6·93	4·37	13·61	4·42	8·72	5·24	9·25
Spleen Disease ...	·16	...	·18	6·67	·65	...	·48	...	·43		·40	1·44
Respiratory Diseases	4·36	2·41	5·62	1·71	6·21	·61	5·42	·42	8·02	·98	6·59	1·01
Phthisis Pulmonalis	·53	50·00	1·13	17·02	1·89	8·08	1·03	15·55	1·10	20·26	1·24	16·74
Scurvy ...	·16	...	·12	...	·33	...	·05	...	·14	...	·13	...
Rheumatism ...	4·52		6·40		5·51		4·89		7·72		6·52	
Venereal Diseases ...	22·07		26·56		21·22		25·08		13·77		20·03	
Eye Diseases ...	2·15		3·09		2·04		2·54		2·51		2·61	
Abscess and Ulcer	8·93	·48	10·02	·49	9·91	·62	8·69	·72	9·40	·67	9·40	·61
Wounds and Accidents ...	9·93		8·97		8·63		9·81		9·22		9·17	
All other Causes ...	17·81		18·55		17·24		15·98		17·75		17·65	
Died out of Hospital	...	...	...	...	...	...	...	...	...	...	...	...
	119·08	...	144·38	...	138·35	...	205·99	...	202·44	...	172·95	

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* See Note to Table V.

EUROPEAN TROOPS. 1869.

VIII.

TABLE showing the GENERAL STATISTICS of SICKNESS and MORTALITY in the PRINCIPAL MILITARY STATIONS of the BENGAL PRESIDENCY.

STATIONS.	Period of Observation.	Average Strength during the period of observation.	Daily Sick per cent. of Average Strength in each Month.												Daily Sick per cent. of Average Strength for the period of occupation.	Admitted per cent. of Average Strength.	Died per 1,000 of Average Strength.			
			Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			A. Cholera.	B. All other Causes. 1. In Hospital.	B. All other Causes. 2. Out of Hospital.	C. All Causes.
Fort William	... ...	904	5·23	6·00	4·61	4·01	4·99	5·26	5·08	5·22	5·17	4·57	3·42	4·63	4·87	98·34	...	17·70	1·11	18·81
Dum-Dum	... ...	500	8·07	2·27	3·55	4·34	5·74	7·20	6·80	7·39	8·43	9·61	6·15	4·17	6·00	131·00	...	34·00	2·00	36·00
Barrackpore	... ...	395	4·23	4·43	4·71	6·07	6·17	5·75	6·68	8·33	8·37	5·59	4·02	5·37	6·08	145·06	...	48·10	2·53	50·63
Berhampore	8 Months, April to November ...	154	...	...	...	3·70	3·75	6·25	6·25	7·05	9·03	7·64	3·68	...	5·54	96·75	6·50	25·96	12·99	45·45
Darjeeling	... ...	68	3·85	1·85	...	2·78	2·78	4·17	2·75	4·17	6·56	4·23	1·41	1·45	2·94	100·00	...	...	...	...
Darjeeling Depôt	8 Months, April to November ...	105	...	...	...	7·48	9·35	8·49	9·43	11·43	12·38	5·65	12·62	...	9·52	179·05	...	38·10	...	38·10
Hazareebaugh	... ...	725	3·07	4·18	5·28	5·68	5·41	5·82	4·32	4·35	5·04	4·24	3·81	2·44	4·41	108·69	...	13·79	1·38	15·17
Dinapore	... ...	867	5·49	5·85	6·59	5·39	5·09	4·63	4·99	6·38	6·41	6·19	5·74	4·83	5·65	142·91	1·15	19·61	1·15	21·91
Benares	... ...	732	4·45	6·67	5·58	5·64	6·91	9·02	7·88	10·00	10·03	8·76	9·16	7·95	7·65	178·42	2·73	23·22	4·10	30·05
Chunar	... ...	56	1·85	3·45	10·53	10·71	14·29	12·50	16·36	7·02	9·09	7·55	9·80	1·67	8·93	230·36	...	71·43	17·86	89·29
Fyzabad	10 Months, January to October ...	924	3·93	3·65	3·77	4·73	5·18	5·40	5·68	5·62	5·71	5·98	...	...	4·98	88·75	18·40	16·23	...	34·63
Lucknow	... ...	2,279	4·02	4·42	5·01	5·44	5·46	6·11	5·59	6·83	7·55	7·04	5·08	6·03	5·62	120·40	27·20	31·60	·44	59·24
Seetapore	... ...	632	4·95	5·31	4·54	4·69	5·85	6·54	5·18	5·97	6·58	5·08	3·68	3·67	5·08	128·57	9·40	26·31	...	35·71
Futtehghur	... ...	192	4·55	5·53	7·04	9·18	8·67	7·18	5·67	6·70	6·70	9·23	10·56	7·78	7·29	155·73	...	15·62	...	15·62
Cawnpore	... ...	1,040	5·24	5·22	5·77	5·26	4·63	6·19	4·57	3·88	8·82	8·47	7·97	7·55	6·15	134·13	11·54	16·35	·96	28·85
Allahabad	... ...	879	6·17	6·94	6·56	6·78	5·83	6·94	7·21	9·64	10·69	12·61	16·16	11·95	8·76	258·02	98·98	55·74	3·41	158·13
Shahjehanpore	... ...	455	2·89	2·77	4·10	3·42	4·02	4·47	4·93	5·39	5·88	5·19	3·79	3·00	4·18	63·00	...	28·57	2·20	30·77
Bareilly	... ...	783	9·99	10·89	6·63	4·92	4·94	5·24	6·25	6·96	6·27	5·71	6·41	5·88	6·90	129·82	...	12·77	...	12·77
Moradabad	... ...	312	4·97	4·69	4·15	4·85	5·92	7·26	6·27	5·30	5·63	5·96	6·03	4·15	5·45	93·59	...	32·05	...	32·03
Raneekhet Road	7 Months, April to October ...	198	...	...	...	4·00	5·05	10·10	13·71	11·17	6·60	3·55	...	...	7·58	100·51	...	10·10	5·05	15·15
Nynee Tal Depôt	8 Months, April to November ...	422	...	...	...	7·82	11·85	12·35	13·47	12·47	12·53	11·35	10·32	...	12·32	150·95	...	26·07	...	26·07
Landour Depôt	7 Months, April to October ...	212	...	...	...	11·27	14·95	14·49	15·35	14·42	10·70	4·50	...	...	12·26	127·36	...	18·87	...	18·87
Chuckrata	8 Months, May to December ...	839	...	...	...	...	4·88	4·99	4·65	5·36	7·01	7·53	6·06	4·09	5·60	61·24	...	9·54	2·38	11·92
Roorkee	... ...	372	4·30	4·31	4·84	4·94	3·35	3·12	3·66	5·73	6·27	6·07	10·78	9·57	5·35	195·97	...	16·13	...	16·13
Meerut	... ...	1,421	5·96	5·78	4·74	5·90	6·02	6·96	7·72	7·49	7·88	7·61	7·10	3·63	6·54	141·10	7·04	26·74	1·41	35·19
Delhi	... ...	362	7·54	5·58	6·52	5·53	6·57	10·81	11·48	11·51	8·20	9·02	8·95	8·48	8·56	234·81	...	30·39	2·76	33·15
Muttra	... ...	420	3·66	4·29	3·90	3·26	3·74	4·10	5·30	5·07	5·87	5·97	6·12	3·21	4·62	108·57	...	9·52	...	9·52
Agra	... ...	895	4·73	3·35	3·30	3·36	3·49	3·60	3·39	5·22	5·12	4·37	3·36	2·84	3·91	97·43	...	16·76	...	16·76
Morar	... ...	790	7·02	5·44	8·42	10·71	7·58	6·96	4·81	5·54	7·67	10·87	10·30	6·96	7·63	248·55	82·89	35·53	1·32	119·74
Gwalior Citadel	... ...	268	2·73	2·70	3·64	6·04	4·11	4·55	4·17	5·60	7·12	11·83	8·78	4·17	5·60	185·30	26·12	44·78	...	70·90
Seepree	... ...	132	3·17	3·90	4·26	3·51	3·73	2·99	4·48	7·55	9·16	5·34	5·39	...	4·55	153·03	22·73	7·57	...	30·30
Jhansi	... ...	611	5·30	5·08	4·39	4·11	4·94	7·49	5·34	8·28	11·34	15·74	14·58	6·25	7·53	325·70	9·82	26·19	3·27	39·28
Nowgong	... ...	170	2·67	4·81	4·57	5·17	5·75	4·65	7·02	5·92	5·09	4·79	7·84	8·16	5·29	125·30	23·53	29·42	11·76	64·71
Saugor	... ...	892	4·96	5·22	5·97	4·15	5·78	4·58	4·27	5·93	8·82	10·73	8·53	5·74	6·17	226·57	42·60	42·60	...	85·20
Jubbulpore	... ...	646	5·57	6·04	5·99	5·86	6·31	6·52	6·84	7·34	10·85	14·58	15·80	17·65	8·98	213·62	17·03	43·35	4·64	65·02
Umballa	... ...	1,332	3·79	4·24	4·94	4·65	4·61	4·54	5·17	5·89	6·28	5·17	4·40	3·01	4·90	135·59	...	13·51	·75	14·26
Dugshaie	9 Months, April to December ...	848	...	...	...	4·33	5·52	5·17	5·29	5·08	3·89	2·83	2·74	2·87	4·13	61·29	...	4·72	...	4·72
Kussowlie Depôt	8 Months, April to November ...	412	...	...	...	11·11	11·95	12·85	12·51	9·64	5·24	4·49	3·03	...	8·98	98·54	...	38·83	2·43	41·26
Subathoo	10 Months, March to December ...	800	...	...	4·67	4·65	7·20	6·95	6·36	4·68	5·65	5·42	4·81	3·35	5·37	120·00	20·00	18·75	...	38·75
Jutogh, Simla	7 Months, April to October ...	81	...	...	...	3·41	4·76	2·44	3·75	2·50	2·53	3·90	...	...	3·70	49·38	...	37·04	...	37·04
Jullundur	... ...	778	4·02	3·87	4·57	6·81	11·32	11·00	5·46	7·11	9·74	12·00	14·01	6·51	7·97	283·24	2·57	30·85	2·57	35·99
Ferozepore	... ...	893	3·54	3·94	3·62	5·01	4·65	5·69	6·03	6·49	4·71	4·16	5·90	3·50	4·70	172·78	1·12	6·72	...	7·84
Mooltan	... ... -	863	4·39	4·38	4·40	3·82	4·28	6·92	4·75	5·13	7·90	8·84	10·13	9·02	6·03	205·91	...	23·17	...	23·17
Dera Ismail Khan	... ...	99	1·98	3·96	2·97	1·98	5·94	4·95	5·00	3·00	5·00	11·00	13·33	11·11	6·06	200·00	10·10	10·10	...	20·20
Sealkote	... ...	1,106	2·80	3·03	3·61	2·99	4·59	5·19	6·58	6·51	6·83	4·77	6·08	4·39	4·70	154·16	...	9·05	·90	10·85
Road-making Detachments, Dalhousie Hills	6 Months, May to October ...	503	...	...	...	...	4·17	4·77	3·38	4·97	6·36	4·57	...	...	4·77	64·02	...	1·99	...	1·99
Dhurmsalla Depôt	7 Months, April to October ...	107	...	...	...	6·12	10·09	16·51	18·04	8·49	11·43	6·67	...	...	11·21	177·57	...	37·38	...	37·38
Kangra	... ...	66	2·74	2·74	1·39	...	1·49	...	2·98	5·97	7·46	8·96	7·58	...	3·03	130·30	...	45·45	...	45·45
Govindghur and Umritsur ...	... ...	117	2·54	2·17	2·17	2·99	2·99	5·22	12·12	6·98	5·69	9·57	11·32	14·81	5·94	201·71	51·28	76·92	8·55	136·75
Fort Lahore	... ...	91	1·28	1·16	...	2·44	3·61	3·57	5·88	8·75	9·33	13·34	6·33	1·27	4·94	307·41	...	61·73	...	61·73
Meean Meer	... ...	974	1·53	4·48	4·06	4·34	6·21	7·30	7·77	9·24	8·77	14·64	16·14	8·95	7·70	399·22	...	26·69	1·03	27·72
Rawul Pindee	... ...	1,567	3·13	3·19	3·10	4·00	4·25	4·62	5·18	5·19	11·24	14·92	9·20	7·09	6·06	247·22	...	15·95	1·28	17·23
Campbellpore	... ...	409	2·16	2·06	2·30	2·58	2·58	3·50	2·86	4·08	4·58	5·27	5·01	2·70	3·43	108·56	...	17·11	4·89	22·00
Attock	... ...	166	4·79	4·09	2·94	1·74	4·07	4·09	5·88	8·24	9·41	17·07	17·83	14·09	7·83	374·10	...	30·12	...	30·12
Road-making Detachments, Murree Hills	7 Months, April to October ...	609	...	...	...	1·15	2·07	2·87	3·34	3·20	2·89	2·12	...	...	2·63	53·37	...	3·29	1·64	4·93
Murree Depôt	6 Months, May to October ...	351	...	...	...	...	6·34	5·34	6·11	7·30	6·23	5·71	...	...	6·27	103·43	...	11·40	...	11·40
Nowshera	... ...	531	5·98	5·08	3·41	3·81	4·19	5·83	7·06	6·90	6·31	8·37	11·50	6·71	6·21	216·76	3·77	35·77	3·77	43·31
Peshawur	... ...	1,723	4·57	3·81	4·14	4·41	8·00	5·97	7·83	8·41	10·59	9·35	8·01	7·05	6·79	299·92	120·11	25·54	...	145·65

EUROPEAN TROOPS, 1869.

IX.

TABLE showing the RATIO in which the PRINCIPAL DISEASES have contributed to make up the ADMISSION RATE of the YEAR in the CHIEF MILITARY STATIONS of the BENGAL PRESIDENCY.

STATIONS.	Average Strength during the period of occupation.	Admitted into Hospital per cent. of Average Strength.											Admitted per cent. of Average Strength from all Causes.
		Cholera.	Heat Apoplexy.	Fevers.	Dysentery.	Diarrhœa.	Hepatitis.	Ophthalmia.	Rheumatism.	Venereal Diseases.	Diseases of the Respiratory Organs.	All other Causes.	
Fort William ...	904	...	·33	24·12	4·20	2·21	3·65	1·06	3·32	25·33	1·88	31·64	98·34
Dum-Dum ...	500	·40	1·00	35·20	5·40	7·80	6·80	3·20	4·40	13·80	8·40	44·60	131·00
Barrackpore ...	395	...	1·77	34·04	8·10	8·86	5·57	1·27	6·57	23·54	4·56	50·88	145·06
Berhampore (8 months) ...	154	·65	2·60	26·62	·65	1·30	2·60	3·25	7·79	18·83	3·89	28·57	96·75
Darjeeling ...	68	...	...	8·82	1·47	4·41	1·47	1·47	13·21	5·88	2·94	60·30	100·00
Darjeeling Depôt (8 months) ...	105	...	...	51·43	3·81	8·57	3·81	1·90	44·76	10·48	12·38	41·91	179·05
Hazareebaugh ...	725	...	·28	35·72	2·21	5·24	2·07	2·21	5·52	21·65	4·69	29·10	108·69
Dinapore ...	807	·46	·81	27·45	6·23	7·27	10·90	1·61	9·16	34·25	7·73	36·04	142·91
Benares ...	732	·41	·82	47·27	7·70	12·57	6·01	2·46	5·33	30·87	8·06	56·83	178·42
Chunar ...	56	1·79	1·79	57·14	21·43	8·93	16·07	8·93	3·57	39·28	8·94	62·50	230·36
Fyzabad (10 months) ..	924	2·60	·43	19·70	3·14	5·52	3·25	8·57	6·93	16·31	1·87	22·40	88·75
Rae Bareilly (10 months) ...	77*	...	...	32·47	...	2·60	6·49	5·19	9·09	.	2·60	28·57	87·01
Lucknow ...	2,279	3·12	1·05	21·11	6·14	14·39	5·09	3·86	3·17	17·07	5·00	39·80	120·40
Seetapore ..	532	1·50	...	46·81	1·84	7·14	3·57	2·44	11·47	21·05	6·02	26·69	128·57
Futtehghur ...	192	..	2·60	15·62	10·42	5·21	3·13	9·90	3·13	40·10	6·77	58·85	155·73
Cawnpore ...	1,040	1·92	1·44	30·96	4·90	8·94	3·65	2·21	3·37	43·94	2·41	35·39	134·13
Allahabad ...	879	13·31	1·71	88·17	10·21	29·69	8·87	2·30	6·94	31·59	6·37	55·71	258·02
Shahjehanpore ...	455	·44	·22	12·53	3·52	1·32	3·08	·44	3·73	14·28	2·42	21·98	63·96
Bareilly ..	783	...	·26	32·44	2·30	4·98	7·66	1·79	2·94	31·74	5·49	28·22	120·82
Moradabad ...	312	...	..	25·32	3·85	2·56	10·90	1·28	·64	29·49	2·24	17·31	93·59
Raneekhet Roads (7 months) ...	198†	...	...	67·17	5·05	1·01	3·54	·50	·50	7·58	2·53	9·60	100·51
Nynee Tal Depôt (8 months) ...	422	...	·24	30·33	2·13	5·45	10·90	3·32	3·79	33·17	3·32	49·29	150·95
Landour Depôt (7 months) ...	212	...	·47	29·25	3·30	9·43	12·74	...	5·66	16·04	5·66	44·81	127·36
Chuckrata (8 months) ...	839	...	...	7·09	2·38	4·41	1·91	1·43	4·29	11·82	3·93	24·08	61·24
Roorkee ...	372	..	·27	123·39	8·33	5·11	2·15	1·34	4·57	16·94	5·11	28·76	195·97
Meerut ...	1,421	1·06	·28	27·73	9·78	11·82	7·81	3·09	7·11	14·36	6·69	51·37	141·10
Delhi ...	362	...	2·49	130·94	7·18	9·94	7·46	1·38	7·74	12·71	12·15	42·82	234·81
Muttra ...	420	...	3·10	26·19	5·71	4·05	2·38	1·43	7·62	11·19	10·24	36·66	108·57
Agra ...	895	...	·89	27·49	4·69	3·24	2·12	1·90	4·25	19·22	5·03	28·60	97·43
Morar ...	760	13·82	2·11	127·63	5·30	15·66	1·97	3·29	6·45	22·37	6·18	43·68	248·55
Gwalior Citadel ...	268	4·10	2·24	55·60	4·10	13·81	3·73	3·36	4·10	35·08	3·36	35·82	165·30
Seepree ...	132	2·27	...	72·73	3·79	9·09	1·52	2·27	·76	32·58	2·27	25·75	153·03
Jhansi ...	611	8·84	·49	186·42	6·71	12·60	5·07	1·64	5·07	40·43	6·55	51·88	325·70
Nowgong ...	170	4·12	4·12	28·24	2·35	2·94	6·47	3·53	2·35	44·12	3·53	23·53	125·30
Saugor ..	892	5·83	·56	106·61	4·48	25·11	8·30	2·47	6·50	14·13	7·29	45·29	226·57
Jubbulpore ...	646	2·01	·77	126·16	7·89	8·51	4·49	2·94	3·41	26·32	3·41	27·71	213·62
Umballa ...	1,332	.	·53	48·20	2·10	7·06	5·40	5·18	12·09	9·91	7·21	37·91	135·59
Dugshaie (9 months) ...	848	...	..	8·96	·83	3·42	2·05	·71	10·49	12·85	7·08	13·01	61·20
Kussowlie Depôt (8 months) ...	412	..	...	17·48	3·64	5·58	7·04	3·64	13·83	8·50	7·52	31·31	98·54
Subathoo (10 months) ...	800	3·00	...	31·50	5·38	6·00	8·13	1·75	5·87	17·87	10·50	30·00	120·00
Jutogh, Simla (7 months) ...	81	...	1·23	9·88	...	7·41	7·41	...	4·94	2·47	2·47	13·58	49·38
Jullundur ...	778	·26	·90	115·63	6·56	13·75	5·78	2·57	10·03	16·71	16·45	44·60	263·24
Ferozepore ...	893	·11	·78	76·15	1·79	7·61	3·81	1·26	4·70	15·45	10·64	47·48	172·78
Mooltan ..	863	·12	·93	113·44	3·48	9·27	2·07	1·16	6·14	10·89	6·02	51·79	205·91
Dera Ismail Khan ...	99	1·01	1·01	146·46	...	11·11	3·03	...	15·15	5·05	7·07	70·71	260·60
Sealkote ...	1,106	...	1·08	55·79	2·62	5·07	4·79	4·43	9·77	11·81	11·21	46·66	154·10
Road-making Detachments, Dalhousie Hills (6 months) ...	503	...	..	12·02	4·57	5·96	1·99	·60	2·10	15·71	4·37	15·71	64·02
Dhurmsalla Depôt (7 months) ...	107	...	...	59·81	6·54	42·06	14·02	1·87	5·61	2·80	7·48	37·38	177·57
Kangra ...	66	...	...	101·52	4·55	9·09	4·55	...	...	1·51	1·51	13·63	136·36
Govindghur and Umritsur ...	117	6·84	2·56	86·32	6·84	13·68	2·56	·86	22·22	18·80	1·71	39·32	201·71
Fort Lahore ...	81	...	1·24	170·01	7·41	41·98	13·58	3·70	...	12·34	4·94	30·51	307·11
Meean Meer ...	974	...	1·03	238·30	4·62	10·06	3·29	3·59	6·88	14·37	6·47	50·61	330·22
Rawulpindee ...	1,567	...	...	174·08	1·02	6·25	3·80	1·28	5·11	13·47	5·87	35·35	247·22
Campbellpore ...	409	...	·24	48·41	·73	6·11	1·47	·73	5·87	8·56	1·47	34·07	108·56
Attock ...	166	...	..	283·13	1·81	7·23	10·24	·60	9·04	15·06	2·41	43·98	374·10
Road-making Detachments, Murree Hills (7 months) ..	609	...	...	15·11	1·31	2·96	1·48	·66	2·13	6·08	2·79	20·85	53·37
Murree Depôt (6 months) ...	351	...	·28	34·76	3·42	11·68	3·13	1·43	7·69	10·54	3·12	27·07	103·12
Nowshera ...	531	·57	·38	150·66	3·58	8·29	2·64	2·64	4·89	9·22	5·46	28·43	216·76
Peshawur ...	1,723	18·75	·64	197·04	2·55	18·22	3·54	1·51	4·03	8·94	8·01	35·69	299·82

* Depôt of Her Majesty's 55th Regiment.

† Chiefly men who had suffered from Fever at Berhampore in 1868.

EUROPEAN TROOPS, 1869.

X.

TABLE showing the ***PREVALENCE*** *of* ***SMALLPOX*** *in each* ***MONTH****, and the* ***DISTRIBUTION*** *of the* ***DISEASE*** *by* ***STATIONS*** *and* ***PROVINCES.***

STATIONS.	Average Strength for the period of observation.	Number of Admissions into Hospital in each Month.												Total Admissions of the Year.	Admitted per cent. of the Average Strength.	Number of Deaths.	Died per 1,000 of the Average Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Chinsurah Depôt ...	....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fort William ...	904	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dum-Dum ...	600	...	1	2	...	...	...	...	...	...	...	...	...	3	...	...	...
Barrackpore ...	305	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Berhampore (8 months) ...	154	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	1,963	...	1	2	...		...	...	...	...	...	...	...	3	·16	...	...
Darjeeling	68	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Darjeeling Depôt	105	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hazareebaugh (8 months) ...	725	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dinapore	867	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Benares ...	732	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chunar	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fyzabad (10 months) ...	924	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rae Barelly (10 months) ...	77	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lucknow ...	2,279	...	2	1	4	4	...	...	...	...	...	...	...	11	...	2	...
Seetapore	632	...	...	1	...	...	...	...	...	...	...	...	...	1	...	1	...
Futtehghur	192	...	1	1	1	...	...	...	...	...	...	...	...	3	...	...	...
Cawnpore ...	1,040	...	1	1	...	2	1		...	...	...	...	1	6	...	...	...
Allahabad ...	879	...	3	2	2	1	...	...	...	...		...	...	8	...	1	...
	8,308	...	7	6	7	7	1	...	...	...	...	...	1	29	·35	4	·48
Shahjehanpore ...	455	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
Bareilly ...	783	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Moradabad ...	312	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Raneekhet Roads (7 months)	198	...	...	...	...	...	...	...	...	...	...	...		...	...	...	...
Nynee Tal Depôt (8 months) ...	122	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Landour Depôt (7 months)	212		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chuckrata (8 months)	839	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Roorkee ...	372	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meerut ...	1,421	1	2	2	...	2	1	...	...	...	...	...	...	8	...	1	...
Delhi ...	362	...	...	...		...		...	...	...	...	...	...	...	...	...	...
Muttra ...	420	...	...	...	...			...	...		...	...	...	...	...	...	...
	5,249	2	2	2	...	2	1	...	...	...	...	...		9	·17	1	·19
Agra ...	895	9	6	4	...	...	...	...	...	...	...	...	...	19	...	3	...
Morar ...	760	...	1	5	2	2	...	...	...	...		...	...	10	...	...	...
Gwalior Citadel ...	268		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Seepree ...	132	...	...	...		...	...	...	...	...	...	...	...	...	...	...	...
Jhansi	611	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowgong	170		...	...		...	...	...	...	...	...	...	...	...	...	...	...
Saugor ...	802	7	8	11	1	...	...	...	...	...	...	...	...	27	...	4	...
Jubbulpore ...	640	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	4,374	16	15	20	3	2		...	...	...	...	...		56	1·28	7	1·60
Umballa ...	1,332	...	...	...	...	...	...	...	2	...	...	...	...	2	...	2	...
Dugshaie (9 months)	848				...		...		...	...	...	...	...	...	...	...	...
Kussowlie Depôt (7 months) ...	112	...	...	...	...			...	...	...	...	...	...		...	...	...
Subathoo (10 months) ...	800	...	...		...	...	...	...	...	...	...	...	...	...	...	...	...
Jutogh (7 months) ...	81			...	...	...		...	...	...	...	...	...	...	...	...	...
Jullundur	778	1	...	...		...		...	...	...	...	...	...	1	...	...	...
Ferozepore	893	3	1	6	3	...	...	...	...	...	...	...	...	13	...	...	...
Mooltan ...	863	...	...			...	...	...	...	...	...	...	...	...	...	...	...
Dera Ismail Khan	99	...			...	...	...	...			...	...	...	...	...	...	...
Sealkote ...	1,106	...	...	...	...	...	...	...	...		...	...	...	...	...	...	...
Road-making Detachments, Dalhousie Hills (6 months)	503			...		...	...	...	...	...	...	...	...	...	...	...	...
Dhurmsalla Depôt (7 months)	107	...		...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kangra ...	66	...		...	...	...	...	...	...	...	...	...	...	...	...	...	...
Govindghur and Umritsur ...	117		...	...	...	...		...	...	...	...	...	...	...	...	...	...
Fort Lahore ...	81		...	...	...		...		...		...	...	...	...	...	...	...
Meean Meer	974	7	3	1		...	1	...	...	...	...	...	...	12	...	2	...
Rawulpindee ...	1,567	...		...	...	...	...	...	...	...	...	...	...	...		...	...
Campbellpore	109	...	...			...	...	...	...	...	...	...	...		...	...	...
Attock ...	166			...	...	...	...	...	...	...	...	...	...	...	...	...	...
Road-making Detachments, Murree Hills (7 months)	809	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree Depôt (6 months) ...	451		...	...			...	...	...	...	...	...	...	...	...	...	...
Nowshera	531		...	...	...		...	...	...	...	...	...	...	...	...	...	...
Peshawur	1,723	...		...		...	...	...		...	...	...	1	1	...	...	...
Troops marching (Punjab)	...	1	2	...	...		...	...	...	...	...	...	...	3	...	...	...
Recruits, &c., marching (Punjab)	...			...			...		...	...	...		...		...	...	...
	13,998	12	6	7	3	...	1	...	2	...	...	...	1	32	·23	4	·28
Troops on the march in Bengal and N. W. Provinces ...	...	...		1	...	...	...	...	...	...	...	...	...	1	...	...	...
Bengal Presidency ...	31,624	30	31	38	13	11	3	...	2	...	...	...	2	130	·38	16	·48

EUROPEAN TROOPS, 1869.

XI.

TABLE showing the PREVALENCE of CHOLERA in each MONTH, and the DISTRIBUTION of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength during the period of occupation.	Number of Admissions into Hospital in each Month.												Total Admissions of the year.	Admitted per cent. of the Average Strength.	Number of Deaths.	Died per 1,000 of the Average Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Chinsurah Depôt ...	......	...	...	...	...	...	...	...	...	...	...	...	4	4	...	4	...
Fort William ...	904	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dum-Dum ...	500	...	...	...	...	1	...	...	...	1	...	...	...	2	...	...	...
Barrackpore ...	395	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Berhampore (8 months) ...	154	...	...	...	1	...	...	...	...	...	...	...	...	1	...	1	...
	1,903	...	...	...	1	1	...	...	...	1	...	...	...	3	·16	1	·53
Darjeeling ...	68	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Darjeeling Depôt (8 months) ...	105	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hazareebaugh ...	725	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dinapore ...	867	...	...	...	...	...	1	1	1	...	...	...	1	4	...	1	...
Benares ...	732	...	...	...	...	...	...	1	2	...	...	...	...	3	...	2	...
Chunar ...	56	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...
Fyzabad (10 months) ...	924	...	...	...	...	...	...	...	22	2	...	...	...	24	...	17	...
Rae Bareilly (10 months) ...	77	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lucknow ...	2,279	...	...	...	...	...	...	4	74	...	...	...	...	78	...	62	...
Seetapore ...	532	...	...	...	2	6	...	...	...	...	...	...	...	8	...	5	...
Futtehghur ...	192	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cawnpore ...	1,040	...	...	...	...	...	1	9	10	...	...	...	...	20	...	12	...
Allahabad ...	879	...	1	27	9	14	15	11	40	...	...	...	...	117	...	87	...
	8,308	...	1	27	12	20	17	26	149	2	...	...	1	255	3·07	186	22·39
Shahjehanpore ...	455	...	...	1	1	...	...	...	...	...	...	...	...	2	...	...	...
Bareilly ...	783	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Moradabad ...	312	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Raneekhet Roads (7 months) ...	198	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nynee Tal Depôt (8 months) ...	422	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Landour Depôt (7 months) ...	212	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chuckrata (8 months) ...	839	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Roorkee ...	372	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meerut ...	1,421	...	...	...	...	...	...	...	...	8	4	3	...	15	...	10	...
Delhi ...	362	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Muttra ...	420	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	5,240	...	...	1	1	...	...	...	...	8	4	3	...	17	·32	10	1·91
Agra ...	895	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Morar ...	760	...	...	...	35	9	1	...	57	3	...	...	...	105	...	63	...
Gwalior Citadel ...	268	...	...	...	...	3	...	...	8	...	...	...	...	11	...	7	...
Seepree ...	132	...	...	...	...	...	...	...	2	1	...	...	...	3	...	3	...
Jhansi ...	611	...	...	...	...	...	...	...	49	5	...	...	...	54	...	6	...
Nowgong ...	170	...	...	...	...	...	3	...	3	1	...	...	...	7	...	4	...
Saugor ...	892	...	...	...	1	28	1	2	20	...	...	...	...	52	...	38	...
Jubbulpore ...	646	...	...	1	2	2	1	3	4	...	...	...	...	13	...	11	...
	4,374	...	...	1	38	42	6	5	143	10	...	...	...	245	5·60	132	30·18
Umballa ...	1,332	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dugshaie (9 months) ...	848	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kussowlie Depôt (7 months) ...	412	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Subathoo (10 months) ...	800	...	...	...	...	...	...	...	18	6	...	...	...	24	...	16	...
Jutogh (7 months) ...	81	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jullundur ...	778	...	...	...	...	1	...	...	1	...	...	...	...	2	...	2	...
Ferozepore ...	893	...	...	...	...	...	...	...	1	...	...	...	...	1	...	1	...
Mooltan ...	863	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...
Dera Ismael Khan ...	99	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	...
Sealkote ...	1,106	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Road-making Detachments, Dalhousie Hills (6 months) ...	503	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dhurmsalla Depôt (7 months) ...	107	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kangra ...	66	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Govindghur and Umritsur ...	117	...	...	...	...	...	...	...	8	...	...	...	...	8	...	6	...
Fort Lahore ...	81	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meean Meer ...	974	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rawul Pindee ...	1,507	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Campbellpore ...	409	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attock ...	166	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Road-making Detachments, Murree Hills (7 months) ...	600	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree Depôt (6 months) ...	351	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowshera ...	531	...	...	...	...	...	...	...	...	3	...	...	...	3	...	2	...
Peshawur ...	1,723	...	...	...	...	...	...	...	...	307	15	1	...	323	...	207	...
Troops marching (Punjab) ...	.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Recruits, &c., marching (Punjab)	......	...	...	...	...	...	...	...	...	...	1	...	...	1	...	1	...
	13,998	...	...	...	...	1	1	...	28	316	16	2		364	2·60	236	16·86
Troops on the march in Bengal and N. W. Provinces ...	......	...	1	...	...	...	...	...	...	...	...	...	...	1	...	1	...
Bengal Presidency ...	34,624	...	2	29	52	64	24	31	320	337	20	5	5	889	2·57	570	16·46

EUROPEAN TROOPS, 1869.

XII.

TABLE showing the MORTALITY in each STATION, the CAUSES of DEATH, and the ratio of DEATHS to STRENGTH.

STATIONS.	Average Strength for the period of observation.	Causes of Deaths in Hospital.																			Died out of Hospital.	Total Deaths of the year.	Died per 1,000 of Average Strength.			
		Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.			A. Cholera.	B. All other Causes.		C. All Causes.
																								1 In Hospital.	2 Out of Hospital.	
Chinsurah Depôt ...	......	4	..	...	...	...	...	...	...	...	3	...	...	1	2	...	...	1	1	...	...	12	...	...	...	...
Invalids, time-expired men, men on leave, &c., marching in Bengal and N. W. Provinces ...	... .	.	...		...	.	2	...	2	...	2	..	...	1	3	...	...	...	...	...	4	14	...	...	...	...
Fort William .	904	...	...	...	...	..	2	3	2	..	3	...		1	4	...	...	...	...	1	1	17	...	17·70	1·11	18·81
Dum-Dum ...	500	. .	...	.	1	...	3	2	2	. .	6	..	...	1	...	...	...	...	1	1	1	18	...	34·00	2·00	36·00
Barrackpore ...	395	...	...	2	.	2	4	1	2	1	3	...	2	...	1	..	...	...	...	1	1	20	...	48·10	2·53	50·63
Berhampore (8 months) ..	164	1	.	...	1	...	2	...	...	...	1	..	. .	...	...	...	. .	...	..	..	2	7	6·50	25·98	12·99	45·45
	1,903	1	..	2	2	2	11	6	6	1	13	...	2	2	5	...	..	...	1	3	5	62	·53	29·42	2·63	32·58
Darjeeling ...	68	...	..	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	. .	..	...	None.	...	...	...	...
Darjeeling Depôt (8 months) ...	105	...	..	..	...	. .	1	.	..	..	1	...	..	1	.	...	...	...	...	1	...	4	...	38·10	...	38·10
Hazareebaugh ...	725	...	..	. .	1	2	1	...	1	..	...	1	1	3	...	...	...	...	...	...	1	11	...	13·79	1·38	15·17
Dinapore ...	867	1	...	..	1	..	3	...	4	1	6	..	..	1	..	...	...	..	.	1	1	19	1·15	19·61	1·15	21·91
Benares ...	732	2	...	...	2	2	3	...	1	1	5	...	1	1	1	...	...	...	...	..	3	22	2·73	23·22	4·10	30·05
Chunar .	56	...	...	.	.	..	...	.	...	.	4	..	..	...	.	..	...	.	...	...	1	5	...	71·43	17·86	89·29
Fyzabad (10 months) ..	924	17	...		..	2	4	1	2	..	3	..	...	1	2	...	..	...	..	...	...	32	18·40	16·23	...	34·63
Rae Bareilly (10 months) . .	77*	..	...	...	..	1	. .	...	1	..	1	...	...	1	2	...	...	.	..	..	...	6*	...	...	...	...
Lucknow .	2,279	62	2	...	2	9	13	1	11	2	11	...	3	3	8	.	...	...	1	6	1	135	27·20	31·60	·44	59·24
Seetapore .	532	5	1	...	6	..	..	1	...	..	1	.	1	1	..	1	..	...	...	2	...	19	9·40	26·31	...	35·71
Futtehghur ...	192	. .	..	...	.	...	...	...	1	...	. .	..	2	...	...	...	..	.	...	...	...	3	...	15·62	...	15·62
Cawnpore ..	1,040	12	...	..	1	2	5	1	2	..	3	...	...	..	2	...	...	. .	..	1	1	30	11·54	16·35	·96	28·85
Allahabad ..	879	87	1	...	8	4	10	1	9	1	9	...	..	3	1	...	...	...	..	2	3	139	98·98	55·74	3·41	158·13
	8,308	186	4	.	21	22	40	5	32	5	41	1	8	15	16	1	..	..	1	13	11	425	22·39	27·45	1·32	51·16
Shahjehanpore ...	455	...	. .	...	2	.	1	..	1	..	.	..	1	2	4	1	..	...	...	1	1	14	...	28·57	2·20	30·77
Bareilly ...	783	..	...	.	...	2	1	1	...	...	3	..	...	1	1	..	. .	...	...	1	...	10	...	12·77	...	12·77
Moradabad .	312	.	...	..	1	...	..	...	2	...	4	..	1	..	...	..	. .	..	...	2	..	10	...	32·05	...	32·05
Raneekhet road (7 months) ...	198	...	.	...	1	1	...	..	...	.	. .	...	.	...	...	.	...	...	...	...	1	3	...	10·10	5·05	15.15
Nynee Tal (8 months) ..	422	...	. .	..	..	...	.	1	..	7	..	.	..	...	...	...	...	...	...	3	. .	11	...	26·07	...	26·07
Landour (7 months) ..	212	..	...	...	..	...	...	.	2	...	.	...	...	.	...	...	...	...	...	2	..	4	...	18·87	...	18·87
Chuckrata (8 months) ...	839	...	..	.	1	1	.	...	2	...	2	...	..	1	...	.	...	...	...	1	2	10	...	9·54	2·38	11·92
Roorkee ...	372	. .	.	...	3	.	1	...	2			..	.	.	..	..	..	...	...	...	...	6	...	16·13	...	16·13
Meerut ..	1,421	10	1	..	2	2	2	5	9	...	9		...	3	3	...	.	.	..	2	2	50	7·04	26·74	1·41	35·19
Delhi ...	362	.	...	..	...	..	5	...	3	.	2	...	...	...	...	...	...	..	...	1	1	12	...	30·39	2·76	33·15
Muttra ...	420	..	...	..		2	1	.	. .		1	...	.	...	...	.	...	..	..	...	...	4	...	9·52	...	9·52
	5,249	10	1	...	10	8	11	6	22	.	28	..	2	7	8	1	..	. .	. .	13	7	134	1·91	22·29	1·33	25·53
Agra ...	895	...	3	.	.	1	3	1	1		3	.		. .	3	.	...	...	...	...	...	15	. .	16·76	...	16·76
Morar ...	760	63	..	2	..	2	10	2	2	..	3	...	...	4	...	...	...	...	..	2	1	91	82·89	35·53	1·32	119·74
Gwalior Citadel ...	268	7	..	..	1	1	7	...	1	...	1	...	1	...	...	..	...	.	...	...	...	19	26·12	44·78	...	70·90
Seepree ...	132	3	.	..	1	...	...	...	...	..	..	..	..	.	...	.		...	...	...	..	4	22·73	7·57	...	30·30
Jhansi ...	611	6	.	...	1	...	3	...	4	.	2	...	...	1	.	.	...	..	...	5	2	24	9·82	26·19	3·27	39·28
Nowgong ...	170	4	..	..	1	...	3	...	...	..	.	..	..	1	...	...	...	..		..	2	11	23·53	29·42	11·76	64·71
Saugor ..	892	38	4	..	4	..	4	...	3	2	14	..	..	1	4	.	...	1	...	1		76	42·60	42·60	...	85·20
Jubbulpore ..	646	11		1	5		4	..	10		3	.	.	2	.	.	.	...	...	3	3	42	17·03	43·35	4·64	65·02
	4,374	132	7	3	13	4	34	3	21	2	26	..	1	9	7	...	..	1	.	11	8	282	30·18	32·46	1·83	64·47
Umballa	1,332	..	2	..	2	1	1	.	1	..	7	.	..	1	3	...	...	...	...	...	1	19	...	13·51	·75	14·26
Dugshaie (9 months) ...	848	..	..	..	1	...	..	...	2	..	...	..	.	1	..	...	...	..		...	...	4	...	4·72	...	4·72
Kussowlie Depôt (7 months) ...	412	...		.		1	...	...	2	.	5	..	2	2	2	...	...	...	...	2	1	17	...	38·83	2·43	41·26
Subathoo (10 months) ...	800	16		..	6	1	...	...	3	...	3	.	.	..	2	...	.	...	...	...	...	31	20·00	18·75	...	38·75
Jutogh (7 months) ...	81		...	..	...	. .	1	...	...	.	1	.	...	...		...	...	..	1	. .	...	3	..	37·04	. .	37·04
Jullundur ...	778	2	.	.	3	7	4	.	...	.	5	..	..	...	3	...	...	...	...	2	2	28	2·57	30·85	2·57	35·99
Ferozepore .	893	1	.	...	...	1	1	..	..	.	1	...	..	..	1	..	...	..	...	2	.	7	1·12	6·72	...	7·84
Mooltan ...	863	...	..	..		3	6	...	2	..	3	..	1	1	1	...	...	..	.	3	...	20	...	23·17	...	23·17
Dera Ismael Khan ...	99	1	.	...	.	...	1	...	.	...	..	...	. .	..	...	...	...	...	. .	...	...	2	10·10	10·10	...	20·20
Sealkote	1,108	..	. .	...	.	1	2	...	2	..	4		..	2	..	...	...	...	...	...	1	12	...	9·95	·90	10·85
Road-making Detachments, Dalhousie Hills (6 months) ...	503	.	..		...	...	...	...	..	...	...	...	...	...	...	..	...	...	1	...	...	1	...	1·99	...	1·99
Dhurmsalla Depôt (7 months) ...	107	...	...	..	...	2	...		1	...	...	...	...	...	...	...	...	1	...	. .	...	4	...	37·38	...	37·38
Kangra ...	66	...	...	.	...	.	. .	..	1	...	1	. .	...	. .	...	..	...	...	. .	1	..	3	. .	45·45	...	45·45
Govindghur and Umritsur ...	117	6	...	...	1	...	2	...	1	..	2	.	.	1	2	...	...	...	..	...	1	16	51·28	76·92	8·55	136·75
Fort Lahore . .	81	...	.		...	1	1	.	2	1	...	...	...	...	..	...	...	...	...	...	...	5	...	61·73	...	61·73
Meean Meer ..	974	..	2	2	1	2	5	1	...	...	6	..	..	1	3	...	..	2	...	1	1	27	...	26·69	1·03	27·72
Rawul Pindee ...	1,567	.	..	1	5	5	...	.	2	1	3	...	.	3	3	...	...	...	...	2	2	27	...	15·95	1·28	17·23
Campbellpore ...	409	...	..		2	.	.	.	..	...	1	. .	...	1	2	...	...	...	...	1	2	9	...	17·11	4·89	22·00
Attock . .	166	...	..	1	..		. .		..	...	1	...	...	1	2	. .	..	..	..	...	...	5	...	30·12	...	30·12
Road-making Detachments, Murree Hills (7 months) ...	609	. .	..	..	..	..	...	..	...	...	...	...	...	...	...	...	...	...	1	1	1	3	...	3·29	1·64	4·93
Murree Depôt (6 months) ...	351	. .	...	...	...	. .	...	..	...	.	...	. .	...	1	1	...	...	1	...	1	..	4	...	11·40	...	11·40
Nowshera ...	531	2	.	3	.	2	1	1	2	..	2	...	3	2	1	...	...	...	...	2	2	23	3·77	35·77	3·77	43·31
Peshawur ...	1,723	207	..	1	8	6	7	...	5	1	5	...	2	2	1	...	...	1	...	5	...	251	120·14	25·54	...	145·68
Troops marching, Punjab ...	......		...	..	1	1	...	...	1	..	...	..	1	1	2	1	...	...	...	3	...	11	...	...	...	...
Recruits, &c., marching, Punjab ...	...	1	.	..	...	2	...	...	1		4	...	2	...	2	...	...	1	.	1	...	14	...	...	...	..
	13,908	236	4	8	30	36	32	2	28	3	54	...	11	20	31	1	...	6	8	27	14	546	16·96	21·15	1·00	39·01
Troops on the march in Bengal and N. W. Provinces ...	... ..	1	..	...	2	. .	1	...	1	...	1	1	...	..	1	...	...	...	...	1	1	10	...	...	...	...
Bengal Presidency ...	34,624	570	16	13	78	72	131	22	112	11	171	2	24	55	73	3	...	8	6	68	50	1,485	16·46	24·08	1·45	42·89

* Depôt, H. M.'s 55th Regiment.

EUROPEAN TROOPS, 1869.

XIII.

TABLE showing in detail the CAUSES of DEATH and INVALIDING.

TOTAL LOSS OF THE ARMY OF THE BENGAL PRESIDENCY BY DEATHS AND INVALIDING, 3,285. PER 1,000 OF AVERAGE STRENGTH, 96·87.

LOSS OF THE ARMY BY DEATH, 1,485.

CAUSES OF DEATH.	Died in Hospital.	Died out of Hospital.	Died per 1,000 of Strength.
Cholera ...	570	...	16·46
Variola ..	16	...	·46
Diphtheria ...	1	...	
Parotitis (Abscess) ...	1	...	
Erysipelas ...	2	...	
Pyæmia ...	2	...	
Febris, Intermittens ...	13	...	4·71
„ Remittens ...	77	...	
„ Continua ...	73	..	
Dysenteria ...	112	...	3·23
Diarrhœa ...	11	...	·32
Rheumatismus ...	2	...	
Syphilis Secundaria ...	3	...	
Hydrophobia ...	1	...	
Ebriositas ...	2	1	
Cancer of Stomach ...	2	...	
„ Melanotic ...	1	...	
Phthisis Pulmonalis ...	73	...	2·11
Tuberculosis Mesenterica ...	1	...	
Abscessus Psoanus ...	2	...	
Meningitis ...	1	...	
Encephalitis ...	5	...	
Insolatio et Apoplexia ...	131	...	3·78
Paralysis ...	6	...	
Epilepsia ...	3	...	
Delirium Tremens ...	22	...	·64
Pericarditis ...	1	...	
Morbus Cordis ...	33	...	1·59
Aneurisma ...	22	...	
Tonsillitis ...	1	...	·69
Bronchitis ..	10	...	
Pneumonia ...	13	...	
Gastritis ...	3	...	
Enteritis ...	2	...	
Peritonitis ...	4	...	
Periœcal Abscess ...	1	...	
Splenitis ...	2	...	·06
Hepatitis ...	171	...	4·94
Cirrhosis ...	3	...	
Icterus ...	1	...	
Ascites ...	3	...	·09
Nephria ...	14	...	
Cystitis (followed by Pyæmia) ...	1	...	
Extravasation of Urine ...	2	...	
Abscess (of Cellular Tissue) ...	1	...	
Atrophy and Debility ...	8	...	·23
Accident ...	5	11	1·62
Rupture of Spleen ...	1	...	
Suicide ...	...	20	
Drowning ...	...	10	
Struck by lightning ...	...	1	
Asphyxia ...	...	1	
Suffocated while drunk ...	...	1	
Murder ...	...	4	
Execution ...	...	1	
Ratio per 1,000 for Deaths from causes not specially calculated above ...	...	...	1·98
	1,435†	50†	42·89

LOSS OF THE ARMY BY INVALIDING, 1,800.

CAUSES OF INVALIDING.	Invalided for Discharge from the service.	Invalided for Change of climate.	Invalided per 1,000 of Strength.
Febris, Intermittens ...	6	89	4·05
„ Remittens et Continua ...	4	38	
Ophthalmia ...	5	5	·30
Dysenteria ...	14	74	3·51
Diarrhœa ...	1	28	
Cholera, Sequelæ of ...	...	8	
Gangræna ...	...	1	
Rheumatismus ...	20	96	3·48
Syphilis Secundaria ..	24	69	3·36
Bubo ...	...	3	
Strictura Urethræ ...	4	12	
Scorbutus ..	...	1	
Ebriositas ...	...	1	
Vermes Tænia ...	1	...	
Anæmia ...	23	91	
Anasarca ...	...	2	
Polysarcia ...	...	1	
Carcinoma (Tumour of Orbit) ...	1	...	
Scrofula et Tuberculosis ...	7	8	
Phthisis Pulmonalis ...	66	92	4·73
Morbus Coxæ ...	...	1	
Fungus Testis ...	1	...	
Meningitis ...	...	1	
Encephalitis ...	1	5	
Myelitis ...	2	1	
Chorea ...	...	1	
Paralysis .	11	11	
Insolatio ...	2	16	·54
Epilepsia ...	15	14	·87
Paralysis Agitans ..	...	1	
Mania ..	5	3	·96
Dementia ...	15	6	
Melancholia ...	2	...	
Hypochondriasis ..	1	...	
Cæcitas ...	3	2	
Dysecœa .	1	4	
Otitis ..	1	...	
Neuralgia ...	2	8	
Pericarditis ...	2	1	4·65
Morbus Cordis ...	56	54	
Aneurisma ...	8	2	
Angina Pectoris ...	...	1	
Palpitatio ...	5	26	
Varix ...	9	5	
Epistaxis ...	...	1	
Tonsillitis ..	...	1	2·19
Bronchitis ...	17	41	
Pleuritis ...	3	6	
Pneumonia ...	...	1	
Asthma ..	1	3	
Ozæna ...	1	1	
Dyspepsia ...	5	13	
Gastritis ...	..	2	
Hæmorrhois ...	1	2	
Fistula in ano ...	1	2	
Hernia ..	16	1	
Splenitis ..	1	10	
Hepatitis ...	26	213	7·17
Cirrhosis ..	...	1	
Nephritis ..	5	5	
Cystitis ...	..	1	
Enuresis ...	...	2	
Varicocele ...	2	...	
Orchitis ..	2	3	
Periostitis ...	2	2	·66
Synovitis .	1	5	
Contractura ...	6	2	
Necrosis ...	...	2	
Lameness ...	2	...	
Loss of front teeth ...	1	...	
Malformation of testis ...	1	...	
Abscess ...	...	1	
Ulcer ...	6	10	
Tumour ...	4	...	
Debility (from disease, and worn out) ...	58	175	10·40*
Dislocation ...	1	...	·87
Fracture ...	9	6	
Contusion ...	...	1	
Concussion of Brain ...	...	4	
Gunshot wound, accidental ...	2	...	
Suicidal wound, cut throat ...	1	...	
Amputation ...	5	...	
Cause not specified ...	2	...	
Ratio per 1,000 for Invaliding from causes not specially calculated above ...	...	...	6·24
	503‡	1,297‡	53·98‡

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* Including Anæmia.

† In addition to the deaths here enumerated, 29 deaths of men of the Bengal Army occurred elsewhere, which do not appear in any Table of this Series. Twenty of these deaths took place in the Depôts of the Bombay Presidency, five in Stations of the Madras Presidency, two in the Presidency Jail at Calcutta, and two in the Punjab of men temporarily detached from their Regiments. Seventeen of these cases appear in the Invaliding Rolls of 1868 and 1869.

‡ The men of the 93rd and 102nd Regiments, who under other circumstances would have appeared as Invalids of the year, accompanied these Regiments to England; the Invaliding Ratio is, therefore, calculated on a Strength of 33,316, the annual average strength of the 93rd and 102nd being struck off from the average strength of the Army for the year.

EUROPEAN TROOPS, 1869.

XIV.

STATEMENT showing the GAIN and LOSS of the REGIMENTS of the ARMY of BENGAL in STRENGTH during the YEAR.

		Sappers and Miners.	Artillery.	Cavalry.	Infantry.	Army of Bengal.
Strength at the beginning of the Year.						
At Head Quarters and on Detachment at the beginning of 1869		62	5,818	2,838	25,129	33,847
Recruits from England in India on march to join		...	176	136	380	692
On Staff employment		65	16	13	54	148
In Military and other Prisons		...	25	4	184	213
Elsewhere, sick in other Hospitals, and men remaining at Convalescent Depôts...		...	114	41	690	845
Total Strength in India at the beginning of 1869* ...		127	6,149	3,032	26,437	35,745*
Additions during the Year.						
Transfers received from other Regiments		24	527	24	90	665
Transferred from Regiments leaving India by volunteering	From Bengal Presidency...	...	21	28	211	260
	From other Presidencies ...	...	95	31	225	351
Recruited in India	New Soldiers ...	...	1	...	6	7
	Time-expired men ...	...	10	10	44	64
Received from England, landed after 1st January	Recruits	3	227	160	1,679	2,069
	Invalids returned ...	...	3	15	270	288
Deserters rejoined		...	6	7	9	22
Total Additions of the Year ...		27	890	275	2,534	3,726
Loss during the Year.						
Transfers given to other Regiments		50	578	27	469	1,124
Time-expired men, who have left the service		2	76	93	1,217	1,388
Men who have purchased their discharge		3	8	8	27	46
Men discharged otherwise		...	...	...	1	1
Invalided	For discharge ...	3	71	78	354	506
	For change of climate ...	1	274	138	883	1,296
Dismissed by sentence of Court Martial		...	13	1	25	39
Deserted		...	11	7	75	93
Died at Head Quarters and on Detachment		4	269	52	1,085	1,410
Died absent from the Regiment ...	At Convalescent Depôts ...	...	6	6	25	37
	In other Hospitals ...	3†	12	2	25	42
Total Loss of the Year ...		66	1,318	412	4,186	5,982
Strength remaining towards the close of 1869		88	5,721	2,895	24,785	33,489

ABSTRACT.

Remained at the beginning of 1869	...	35,745
Added during 1869	...	3,726
Total	...	39,471
Deduct Loss during 1869 ...	...	5,982
Remain towards the close of 1869 ...	...	33,489

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* The strength here shown approximates to the strength of April, and not of January, since the Regiments which joined the Army of the Bengal Presidency in the early part of the year subsequent to January appear in this Return with their strength as at the date of their arrival in India. Regiments which have arrived at the close of 1869 do not appear in the totals shown above.

† Men detached on Staff employment, whose deaths are not included in the General Tables.

EUROPEAN TROOPS, 1869.

XV.

DISTRIBUTION of the EUROPEAN ARMY of the BENGAL PRESIDENCY on 2nd July 1869.

(An Index to the Table which follows.)

STRENGTH OF THE ARMY ON 2ND JULY 1869, 35,240.

ARTILLERY.	STATION.	STRENGTH.	INFANTRY.	STATION.	STRENGTH.
A. Horse Brigade A. Battery	Meerut	128	3rd Regiment, 1st Battalion	Dugshaie	851
B. „	Peshawur	125	5th „ 1st „	Ferozepore	772
C. „	Lucknow	119	„ „	Kangra	67
D. „	Meerut	123	6th „ 1st „	Rawulpindee	558
E. „	Peshawur	110	„ „	Huzara Hills	226
C. Horse Brigade F. „	Benares	122	7th „ 1st „	Saugor	713
F. Horse Brigade A. „	Umballa	133	11th „ 1st „	Fyzabad	782
B. „	Sealkote	124	12th „ 2nd „	Jubbulpore	518
C. „	Morar	110	„ „	Nowgong	171
D. „	Rawulpindee	138	14th „ 1st „	Cawnpore	728
E. „	Umballa	131	19th „ 1st „	Rawul Pindee	537
F. „	Meean Meer	121	„ „	Huzara Hills	224
8th Brigade B. Battery	Lucknow	130	25th „ 2nd „	Bareilly	571
C. „	Morar	122	„ „	Raneekhet Hills	198
D. „	Bareilly	133	26th „	Fort William	858
E. „	Fyzabad	139	30th „	Peshawur	702
F. „	Seetapore	122	35th „	Shahjehanpore	446
G. „	Cawnpore	138	„	Moradabad	303
H. „	Agra	120	38th „	Sealkote	655
10th Brigade A. Battery	Barrackpore	140	„	Chumba Hills	178
B. „	Meerut	134	41st „	Subathoo	819
C. „	Barrackpore	152	55th „	Chuckrata	831
D. „	Allahabad	136	„ Depôt	Rae Bareilly	79
E. „	Saugor	127	58th „	Allahabad	724
F. „	Dinapore	135	60th „ 2nd Battalion Hd. Qrs.	Seetapore	399
G. „	Jubbulpore	125	„ „ Right Wing	Benares	356
19th Brigade A. Battery	Jhansi	139	62nd „	Lucknow	825
B. „	Peshawur	133	77th „	Agra	697
C. „	Meerut	135	79th „ Head Quarters	Roorkee	378
D. „	Mooltan	130	„	Delhi	311
E. „	Rawulpindee	126	85th „	Meean Meer	555
F. „	Meean Meer	131	„	Fort Lahore	70
G. „	Jullundur	140	„	Dalhousie Hills	150
22nd Brigade Head Quarters	Morar	7	88th „	Nowshera	496
A. Battery	Jutogh	87	„	Attock	101
B. „	Ferozepore	123	„	Huzara Hills	100
3. „	Fort William	69	92nd „	Jullundur	573
4. „	Peshawur	67	„	Umritsur	67
5. „	Meean Meer	69	„	Chumba Hills	121
6. „	Saugor	60	93rd „	Jhansi	160
7. „	Agra	58	„	Seepree	131
24th Brigade 1. Battery	Mooltan	71	96th „	Dum-Dum	500
2. „	Fortress Gwalior	68	„	Barrackpore	150
3. „	Lucknow	69	„	Berhampore	160
4. „	Allahabad	70	102nd „	Lucknow	726
5. „	Meean Meer	72	103rd „	Morar	158
6. „	Govindghur	64	„	Fortress Gwalior	216
25th Brigade Head Quarters	Allahabad	5	104th „	Peshawur	672
1. „	Darjeeling	72	105th „	Meerut	617
2. „	Delhi	57	„	Futtehghur	104
3. „	Morar	67	106th „	Umballa	738
4. „	Attock	69	107th „	Hazareebaugh	710
5. „	Huzara Hills	79	109th „	Mooltan	652
Sappers and Miners	Chuckrata	30	„	Dera Ismael Khan	101
„ Depôt	Roorkee	5	3rd Battalion Rifle Brigade	Dinapore	746
			„	Chunar	55
CAVALRY.			CONVALESCENT DEPOTS		
5th Lancers	Lucknow	155	„	Darjeeling	106
4th Hussars	Meerut	439	„	Nynee Tal	418
7th „	Sealkote	125	„	Landour	213
11th „	Muttra	114	„	Kussowlie	386
19th „	Benares	241	„	Dhurmsalla	107
„	Cawnpore	166	„	Murree	369
20th „	Campbellpore	322	PRESIDENCY DEPOT.		
„	Sydun Bowlie	39			
21st	Umballa	347	„	Chinsurah	10

EUROPEAN

X

ABSTRACT of the RETURNS showing the ADMISSIONS,

This Table must not be regarded as exhibiting with accuracy the relation of Sickness and Mortality to the localities indicated; the Regimental Return for the which have spent a few weeks only of 1869

1.—*REGIMENTS of BENGAL PROPER,*

	REGIMENTS & BATTERIES, & STATION OF 1869.	Year of Arrival in the Bengal Presidency.	Date of Arrival from Station previously occupied.	Average Strength during 1869.
1	20th Regiment, Fort William	1868	28th June 1868, from Abyssinia and Bombay Presidency*	871
2	XXII Brig., 3 Battery, R. Art., Fort William ...	...	... ...	72
3	96th Regiment, Head Quarters Dum-Dum, Wing at Barrackpore and Berhampore (10 months) ...	1869	20th February 1869, from Bombay Presidency†	850
4	XVI Brig., A. Battery, R. Art., Barrackpore ...	...	January 1869, from Hazareebaugh ...	143
5	XVI Brig., C. Battery, R. Art., Barrackpore ...	...	December 1864, from Hazareebaugh ...	152
6	107th Regiment, Hazareebaugh	*b*	January 1869, from Allahabad ...	807
7	3rd Battalion Rifle Brigade, Dinapore, (Detachment of 50 men at Chunar)	1857 *a*	January 1869, from Seetapore and Moradabad	848
8	XVI Brig., F. Battery, R. Art., Dinapore	...	December 1864, from Barrackpore ...	143
9	19th Hussars, Head Quarters, Benares	*b*	January 1868, from Meerut	242
10	2-60th Regiment, Wing, Benares	1867 *a*	January 1869, from Fort William ...	382
11	C. Brig., F. Battery, R. H. Art., Benares	...	December 1865, from Lucknow ...	134
12	1-11th Regiment, Fyzabad	1864 *a*	October 1864, from England	843
13	VIII Brig., E. Battery, R. Art., Fyzabad	1868 *a*	April 1868, from England	135
14	5th Lancers, Lucknow	1864 *a*	January 1864, from England	470
15	62nd Regiment, Lucknow (10 months)	1869 *a*	24th February 1869, from England ...	834
16	102nd Regiment, Lucknow	1868 *c*	February 1868, from Kamptee	685
17	A. Brig., C. Battery, R. H. Art., Lucknow	1866 *a*	February 1866, from England	131
18	VIII Brig., B. Battery, R. Art., Lucknow .. .	1866 *a*	December 1866, from England	135
19	XXIV Brig., 3 Battery, R. Art., Lucknow	...	January 1869, from Morar	72
20	2-60th Regiment, Head Quarters, Seetapore ..	1867 *a*	January 1869, from Fort William ...	406
21	VIII. Brig., F. Battery, R. Art., Seetapore	1868 *a*	April 1868, from England	135

(*a*) From England. (*b*) Reorganised from Local Regiments. (*c*) From Madras Presidency.

* Landed in the Bombay Presidency from England in 1865. † Landed from England in 1866.

TROOPS, 1869.

VI.

DEATHS, and INVALIDING of each REGIMENT for the Year.

Year is designed to include all cases of disease in men borne on the Regimental Rolls, whether absent or present with the Regiment. Newly arrived Regiments in India are not included in this Table.

BEHAR, BENARES, OUDE, and CAWNPORE.

Causes of Admissions into Hospital, of Deaths in and out of Hospital, and of the Invaliding of 1869.

	Total Admissions and Loss of the Year by Death and Invaliding.		Cholera.	Smallpox.	Intermittent Fever.	Remittent and Continued Fevers.	Dysentery.	Diarrhoea.	Erysipelas.	Ophthalmia.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Scurvy.	Anaemia and Debility.	Phthisis Pulmonalis and Haemoptysis.	Apoplexy, Epilepsy, and Brain Affections.	Neuralgic Affections.	Drunkenness.	Delirium Tremens.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
1	Admissions	901	...		234	17	44	15	..	14	30	101	36	2	2	7	7	10	...	22	4	22	1	1	36	28	...	4	70	65	...	33
2	Admissions	58	..		7	...	..	5		...	9	4	...	...	...	...	2	...	...	5	2	..	...		1	3		..	6	13	..	1
3	Admissions	1,001	4	3	68	207	10	51	1	20	19	113	13	1	45	7	13	12	...	8	3	47	3	1	52	63	2	7	55	78	...	62
4	Admissions	198	...	..	34	19	11	15		3	13	36	5	...	2	1	4	...	..	...	2	3	2	...	5	17			7	18		1
5	Admissions*	100	...		10	20	12	11	...	...	6	25	6	..	1	...	8	3	...	1	1	7	2	1	3	23	..	4	16	17		4
6	Admissions	840	1	1	165	112	17	37	2	20	41	163	22	1	1	8	9	7	...	1	5	33	2	2	20	48	5	14	31	61	..	21
7	Admissions	1,191	4	...	97	143	58	55	3	20	71	259	21	...	41	1	8	5	2	2	11	49	8	4	102	71	5	13	30	44	...	49
8	Admissions	211	...	..	25	12	14	20		2	2	26	4	...	4	1	4	3	...	3	...	11	1	..	12	6		1	18	19		20
9	Admissions	329	1		35	5	15	6		7	9	71	7		2	1	2	...	...	2	4	18	1	...	11	16	1	7	44	48	...	13
10	Admissions	706	3		12	260	45	74	1	12	12	139	4	...	4	...	17	2	...	6	3	34		3	27	33	..	15	50	23	...	18
11	Admissions	229	...		15	25	3	16	1	2	9	38	6	...	8	1	1	2	..	...	...	7	2	1	8	16	1	1	25	28	..	12
12	Admissions	806	23	1	31	158	23	39	2	69	58	131	9	...	7	5	7	1	...	2	4	30	10	2	38	19	2	18	39	54		21
13	Admissions	103	3		1	27	8	18	..	...	12	43	3	...	3	..	...	2	..	2	1	7	2	...	..	7	2	4	25	14	..	9
14	Admissions	310	5		11	35	11	8	...	14	20	41	1	...	...	10	6	3	1	7	1	10	2	...	17	24	2	1	21	41	...	15
15	Admissions	1,035	54	2	7	209	95	164	...	24	19	95	9	...	6	10	21	...	...	5	3	30	5	1	40	26	2	9	110	24	...	62
16	Admissions	851	13	4	66	61	27	135	...	27	11	100	13	...	5	12	4	8	...	3	4	29	3	...	35	96	1	1	50	61	..	18
17	Admissions	151	...	2	30	1	5	5	...	3	2	9	...	...	2	3	...	1	...	1	...	6	...	...	14	16		2	9	29	..	11
18	Admissions	185	3	3	37	6	2	9	..	7	5	26	...	...	2	1	2	..	1	1	4	8	1	...	6	10		6	9	29		4
19	Admissions	123	2	...	...	24	2	2	...	9	11	15	1	...	1	2	4	...	2	...	...	3	1	...	10	10		...	8	13	..	3
20	Admissions	566	9	..	34	173	13	34	...	10	40	82	8	...	..	3	2	5		2	5	26	3	...	11	25	...	14	23	24	...	11
21	Admissions	173	...	1	32	23	1	6	1	6	18	22	...	...	2	1	...	..	...		1	7	1	...	10	11	...	2	3	12	...	13

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* Of these deaths five occurred in a Detachment of 56 men stationed during the year at Chunar.

† The men of this Regiment who would have been invalided for change accompanied the Regiment to England.

REGIMENTS of BENGAL PROPER, BEHAR,

	REGIMENTS & BATTERIES, & STATION OF 1869.	Year of Arrival in the Bengal Presidency.	Date of Arrival from Station previously occupied.	Average Strength during 1869.	[illegible]	[illegible]	[illegible]
22	19th Hussars, Left Wing, Cawnpore	*b*	March 1869, from Meerut	16[illegible]	[illegible]	[illegible]	[illegible]
23	1-14th Regiment, Cawnpore	1868 *a*	December 1868, from England ...	760	[illegible]	[illegible]	[illegible]
24	VIII Brig., G. Battery, R. Art., Cawnpore	1868 *a*	April 1868, from England	145	[illegible]	[illegible]	[illegible]
25	58th Regiment, Allahabad	1865 *a*	January 1869, from Darjeeling and Benares	661	[illegible]	[illegible]	[illegible]
26	XVI Brig., D. Battery, R. Art., Allahabad	...	January 1869, from Barrackpore ...	143	[illegible]	[illegible]	[illegible]
27	XXIV Brig., 4 Battery, R. Art., Allahabad . . .	...	March 1865, from Attock	71	[illegible]	[illegible]	[illegible]
	REGIMENTS OF BENGAL PROPER, BEHAR, BENARES, OUDE, AND CAWNPORE ...			10,168	[illegible]	[illegible]	[illegible]

2.—*REGIMENTS of ROHILCUND, MEERUT,*

1	37th Regiment, Head Quarters, Shahjehanpore .	1867 *a*	November 1868, from Bareilly... .	518	[illegible]	[illegible]	[illegible]
2	37th Regiment, Wing, Moradabad	1867 *a*	November 1868, from Bareilly	340	[illegible]	[illegible]	[illegible]
3	2-25th Regiment, Bareilly*	1868 *d*	November 1868, from Shahjehanpore and Berhampore.	840	[illegible]	[illegible]	[illegible]
4	VIII Brig., D Battery, R. Art., Bareilly	1866 *a*	November 1867, from Seetapore	115	[illegible]	[illegible]	[illegible]
5	79th Regiment, Head Quarters, Roorkee	1857 *a*	December 1868, from Rawulpindee	414	[illegible]		[illegible]
6	Sappers and Miners, Chuckrata, with Depôt at Roorkee	...	... .. .	67	[illegible]	[illegible]	[illegible]
7	4th Hussars, Meerut	1868 *a*	March 1868, from England ..	157		[illegible]	
8	105th Regiment, Meerut, (Detachment of 105 men at Futtehghur).	1866 *e*	January 1869, from Dinapore .. .	778	[illegible]	[illegible]	[illegible]
9	A Brig., A Battery, R. H. Art., Meerut	1866 *a*	March 1866, from England ..	133	[illegible]	[illegible]	[illegible]
10	A Brig., D Battery, R. H. Art., Meerut	1865 *a*	March 1865, from England .. .	131	[illegible]	[illegible]	[illegible]
11	XVI Brig., B Battery, R. Art., Meerut	. .	February 1867, from Saugor ...	142	[illegible]	[illegible]	[illegible]
12	XIX Brig., C Battery, R. Art., Meerut .. .	...	December 1866, from Agra ...	110	[illegible]	[illegible]	[illegible]
13	79th Regiment, Wing, Delhi	1857 *a*	December 1868, from Rawulpindee	312	[illegible]	[illegible]	[illegible]
14	XXV Brig., 2 Battery, R. Art., Delhi	...	January 1865, from Saugor ...	55	[illegible]	[illegible]	[illegible]
15	11th Hussars, Muttra	1868 *e*	January 1868, from Mhow .	151	[illegible]	[illegible]	[illegible]

(*a*) From England. (*b*) Reorganised from Local Regiments. (*c*) From Madras Presidency. (*d*) From Ceylon. (*e*) From Bombay Presidency.

* Working party of 198 men in the Hills near Raneekhet, from April to October, drawn chiefly from the Wing which suffered severely from Fever at Berhampore in 1868.

BENARES, OUDE, and CAWNPORE,—continued.

	Total Admissions and Loss of the Year by Death and Invaliding.		Causes of Admissions into Hospital, of Deaths in and out of Hospital, and of the Invaliding of 1869.																													
			Cholera.	Smallpox.	Intermittent Fever.	Remittent and Continued Fevers.	Dysentery.	Diarrhœa.	Erysipelas.	Ophthalmia.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Scurvy.	Anæmia and Debility.	Phthisis Pulmonalis and Hæmoptysis.	Apoplexy, Epilepsy, and Brain Affections.	Neuralgic Affections.	Drunkenness.	Delirium Tremens.	Heart Diseases and Aneurism.	Tonsilitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Functional Derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscesses and Ulcers.	Injuries and Accidents.	Punished.	All other Causes.
22	Admissions	249	2	...	10	32	6	3	...	2	4	56	3		6	1	4	...	..	...	6	1	1	...	10	8	1	6	18	41		11
23	Admissions	958	17	6	77	120	47	27	2	21	17	354	10	...	2	9	10		..	6	2	11	5	1	11	20	1	9	99	35		24
24	Admissions	210	3	.	31	39	1	14		3	9	41	5	..		2	3	1	.	3	..	5	3		6	6		.	27	11		6
25	Admissions	1,906	105	6	403	167	103	223	2	16	35	291	9	.	73	8	22	4		4	3	28	2	3	81	75		13	19	71	.	50
26	Admissions	327	8	1	31	86	8	31		4	6	12	2		15		5	3	..	1		12	6		5	9		1	21	20	...	10
27	Admissions	166	2	1	17	44	7	15	1	2	6	23	1		4	2		1		1		1	2	.	3	7	...		9	10		4
	Admissions	11,164	262	31	1,592	2013	618	1010	16	317	506	2186	198	4	238	99	165	68	6	88	69	157	72	20	586	693	28	157	599	900		509

AGRA, and CENTRAL INDIA.

	Total Admissions and Loss of the Year by Death and Invaliding.		Cholera.	Smallpox.	Intermittent Fever.	Remittent and Continued Fevers.	Dysentery.	Diarrhœa.	Erysipelas.	Ophthalmia.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Scurvy.	Anæmia and Debility.	Phthisis Pulmonalis and Hæmoptysis.	Apoplexy, Epilepsy, and Brain Affections.	Neuralgic Affections.	Drunkenness.	Delirium Tremens.	Heart Diseases and Aneurism.	Tonsilitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Functional Derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscesses and Ulcers.	Injuries and Accidents.	Punished.	All other Causes.
1	Admissions	366	2	1	17	50	19	10	..	4	18	77	7	.	10	6	2	2		2	3	11	1		27	19	2	4	37	14	..	21
2	Admissions	358	...	.	6	81	15	10	1	5	2	105	12		1	6		1			3	9	.		13	15	...	6	16	12	...	9
3	Admissions	1,097	2	...	277	115	31	34	1	13	15	262	41	.	3	13	3	1		2	9	30	12	13	65	35	3	19	27	31	..	7
4	Admissions	160	.	...	2	10	1	12	3	3	5	39	2		6	.	...	2	..	2	1	8	2	1	10	15	1	2	13	13	.	7
5	Admissions	760	..	1	156	7	35	21		7	14	53	12	..		1	9	1		1	1	17	3	8	16	11	2	7	32	18	...	21
6	Admissions	35	...	..	10	1	1	3	.	1	1	1	...	...	3		1	...	..	1	.				2	7				1		2
7	Admissions	688	2	1	17	172	26	55	1	23	37	72	1		3	18	4	1	...	7	1	36	1	...	37	15	1	2	74	50	..	25
8	Admissions	1,137	10	5	85	50	108	58	3	33	34	95	18		15	24	10	8		6	18	36	15	..	67	107	2	18	62	103	...	87
9	Admissions	148	...	...	23	14	7	19	.	3	13	11	4	.	..	2	2	2		.	1	5	...		7	12	.	3	5	10	..	5
10	Admissions	153	1	2	7	13	10	25	...	2	5	16	10		1	4	2		...	1	3	9	...	..	.	11	1		7	17	..	6
11	Admissions	191	...	...	17	24	13	27	..	...	4	21	6	...	3	1		1		...	.	11	3	...	5	16		3	11	21	..	4
12	Admissions	103	1	1	24	7	8	9	..	5	5	22	8	.	2	...	..	..	.	3	6	5	1		8	19	.	3	6	15	..	5
13	Admissions	706	...	...	369	17	26	27		5	22	39	5	...	1	2	8	4	...	2	1	28	3	7	26	30	...	1	27	43	...	13
14	Admissions	145		...	70	1	2	10			5	4	1	.	...	.	2	.		1		6	1		6	6		...	7	14		2
15	Admissions	502		.	48	80	24	20	1	1	29	17	10	.	3	4	20	5	...	6	1	37	6	..	13	25	1	13	14	39	.	24

TABLE

REGIMENTS of ROHILCUND, MEERUT,

	Regiments & Batteries, & Station of 1869.	Year of Arrival in the Bengal Presidency.	Date of Arrival from Station previously occupied.	Average Strength during 1869.	[illegible]	Loss per 1000. By Deaths.	Loss per 1000. By Invaliding.
16	77th Regiment, Agra ...	1858	February 1869, from Nowshera ...	734	76·16	[illegible]	39·51
17	VIII Brig., H. Battery, R. Art., Agra ...	1868a	March 1868, from England	141	151·77	21·28	56·74
18	XXII Brig., 7 Battery, R. Art., Agra ..	.	April 1866, from Darjeeling ...	67	[illegible]	14·93	[illegible]
19	103rd Regiment, Morar (Detachment of 220 men at Fortress Gwalior) .	1867b	February 1867, from Bombay Presidency	648	210·67	[illegible]	80·17
20	F. Brig., C. Battery, R. H. Art., Morar ..	...	December 1865, from Meerut ...	132	[illegible]	[illegible]	[illegible]
21	VIII Brig., C. Battery, R. Art., Morar ...	1866a	November 1867, from Fyzabad ..	124	[illegible]	[illegible]	[illegible]
22	XXV Brig., 3 Battery, R. Art., Morar ...	...	December 1868, from Fort William ..	76	[illegible]	[illegible]	[illegible]
23	XXIV Brig., 2 Battery, R. Art., Fortress Gwalior ...	..	February 1869, from Meean Meer .	72	[illegible]	[illegible]	[illegible]
24	93rd Regiment, Jhansi (Detachment of 133 men at Seepree) ...	1857a	January 1867, from Sealkote ...	503*	[illegible]	[illegible]	
25	XIX Brig., A. Battery, R. Art., Jhansi ...	...	January 1868, from Ferozepore ...	142	[illegible]	[illegible]	[illegible]
26	1-7th Regiment, Saugor ...	1857a	January 1866, from Ferozepore ...	810	[illegible]	[illegible]	[illegible]
27	XVI Brig., E. Battery, R. Art., Saugor	.	January 1867, from Allahabad .	142	[illegible]	[illegible]	[illegible]
28	XXII Brig., 6 Battery, R. Art., Saugor ..	..	January 1869, from Meean Meer ..	72	[illegible]	[illegible]	[illegible]
29	2-12th Regiment, Jubbulpore (Detachment of 175 men at Nowgong) ...	1864a	December 1867, from Seetapore	738	[illegible]	[illegible]	[illegible]
30	XVI Brig., G. Battery, R. Art., Jubbulpore ..	..	January 1867, from Hazareebaugh ...	138	[illegible]	[illegible]	[illegible]
	Regiments of Rohilcund, Meerut, Agra, and Central India			9,508	[illegible]	[illegible]	[illegible]

(a) From England. (b) From Bombay Presidency.

* The admission-rate is calculated on this strength, which is the strength remaining after the Volunteers and five men died out of their strength. The deaths here shown include these

† The men who would otherwise have been invalided

AGRA, and CENTRAL INDIA,—continued.

Causes of Admissions into Hospital, of Deaths in and out of Hospital, and of the Invaliding of 1869.

	Total Admissions and Loss of the Year by Death and Invaliding.	Cholera.	Smallpox.	Intermittent Fever.	Remittent and Continued Fevers.	Dysentery.	Diarrhœa.	Erysipelas.	Ophthalmia.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Scurvy.	Anæmia and Debility.	Phthisis Pulmonalis and Hæmoptysis.	Apoplexy, Epilepsy, and Brain Affections.	Neuralgic Affections.	Drunkenness.	Delirium Tremens.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
16	Admissions 559	...	6	39	130	39	32	...	13	5	124	15	...	11	15	4	1	.	3	3	8	1	3	12	7	...	8	23	32	...	16
	Deaths [illegible]																														
	Invaliding 21																														
17	Admissions 214	...	...	5	48	5	5	1	6	16	24	9	...	5	2	7	2	..	3	..	10	3	..	3	15	...		12	25	.	8
	Deaths [illegible]																														
	Invaliding [illegible]			1								1		1																	
18	Admissions 110	.		7	22	...	3	..	...	10	14	2	.	3	...	1	.	.	...	...	15		4	7	5	...	.	3	9	.	6
	Deaths 1				1																										
	Invaliding 7																														
19	Admissions 1,051	54	3	618	318	26	93	1	15	42	172	22	.	23	5	17	..	...	5	7	36	2	2	18	13	2	5	41	51	..	27
	Deaths [illegible]																														
	Invaliding [illegible]			1																											
20	Admissions 208	13	2	62	33	9	25	2	2	4	61	8	...	5	1	1	1	...		1	6	1	.	8	9		3	16	30	..	5
	Deaths [illegible]																														
	Invaliding [illegible]																														
21	Admissions 268	32	4	70	20	9	21	...	3	4	32	..	.	2	5	3	2	...		1	1	3	3	6	11	1	2	6	12	.	4
	Deaths [illegible]																														
	Invaliding [illegible]			1																											
22	Admissions 195	10	1	37	47	10	10	...	1	2	10	4	.	4	1	2		...	1	2	7	..	...	4	10	1	1	11	6	..	10
	Deaths [illegible]																														
	Invaliding [illegible]																														
23	Admissions 152	5	...	27	25	2	14	...	1	3	22	3	...	1	2	5	.	...	1	2	1	2		7	11	...	..	8	9	.	1
	Deaths [illegible]																														
	Invaliding [illegible]																														
24	Admissions 1,694	44	...	920	26	42	73	...	14	21	171	21	.	34	2	4	3	...	3	2	36	1	4	31	61	1	19	50	61	..	38
	Deaths [illegible]																														
	Invaliding [illegible]																														
25	Admissions 342	1	...	161	3	3	10	...	.	8	71	3	...	5	...	1	...	...	1	...	6	1	..	9	12	1	2	4	32	..	8
	Deaths [illegible]																														
	Invaliding [illegible]																														
26	Admissions 1,692	45	21	735	53	41	186	...	16	41	118	15	1	11	9	16	3	...	1	2	51	8	3	70	61	4	11	62	73	...	33
	Deaths [illegible]																														
	Invaliding [illegible]					1																									
27	Admissions 290	3	5	128	2	2	21	.	3	10	23	2	..	5	2	1	1	..	..	2	7	.	2	8	12	...	9	20	10	..	3
	Deaths [illegible]		1																												
	Invaliding [illegible]																														
28	Admissions 168	3	1	50	6	1	23		3	3	10	2	...	...	...	...	.	..	...	1	4	1	1	11	8	...	4	11	8	...	8
	Deaths [illegible]																														
	Invaliding [illegible]																														
29	Admissions 1,393	10	...	738	29	43	56	1	17	16	196	27	...	8	9	18	7	...	4	6	22	.	6	40	20	4	9	27	33	...	32
	Deaths [illegible]																														
	Invaliding [illegible]			1																											
30	Admissions 300	2	..	107	17	14	10	1	7	3	40	10	...	3	2	1	4	...	...	2	6	1	2	11	9	1	3	13	14	...	11
	Deaths [illegible]			1																											
	Invaliding [illegible]								1											1											
	Admissions 15,044	249	54	6,155	146	572	922	16	209	307	1959	322	1	201	136	143	58	..	59	79	467	72	60	576	646	28	157	678	821	..	447
	Deaths [illegible]	1						1				2						1													
	Invaliding [illegible]			2	11	27						1					2					2			1						

were struck off in July, and whose admissions are not here entered. These Volunteers, however, remained at Jhansi,
Volunteers, and the death-rate is calculated on a strength of 639 for the year.
for change went home with the Regiment.

3.—REGIMENTS of

	REGIMENTS & BATTERIES, & STATION OF 1869.	Year of Arrival in the Bengal Presidency.	Date of Arrival from Station previously occupied.	Average Strength during 1869.	[illegible]	[illegible]
1	21st Hussars, Umballa	.	November 1863, from Muttra ..	411		
2	106th Regiment, Umballa	1867*b*	April 1868, from Meean Meer	780		
3	F. Brig., A. Battery, R. H. Art., Umballa ..	..	March 1864, from Rawulpindee	140		
4	F. Brig., E. Battery, R. H. Art., Umballa		April 1868, from Peshawur ...	140		
5	92nd Regiment, Jullundur (Detachment of 68 men at Umritsur)*	1868*a*	March 1868, from England	847		
6	XIX Brig., G. Battery, R. Art., Jullundur	.	January 1866, from Peshawur	140		
7	1-5th Regiment, Ferozepore (Detachment of 68 men at Kangra)	1867*a*	February 1867, from England .	876		
8	XXII Brig., B. Battery, R. Art., Ferozepore	...	January 1868, from Jhansi .	139		
9	109th Regiment, Mooltan .	1867*b*	December 1867, from Bombay Presidency...	820		
10	XIX Brig., D. Battery, R. Art., Mooltan		December 1864, from Rawulpindee ...	141		
11	XXIV Brig., 1 Battery, R. Art., Mooltan ..		March 1866, from Govindghur .	77		
12	7th Hussars, Sealkote	1857*a*	December 1864, from Campbellpore ...	444		
13	38th Regiment, Sealkote* ..	1857*a*	November 1866, from Subathoo	865		
14	F. Brig., B. Battery, R. H. Art., Sealkote	..	January 1866, from Peshawur ...	132		
15	XXIV Brig., 6 Battery, R. Art., Umritsur .		April 1865, from Mooltan ...	66		
16	85th Regiment, Meean Meer (Detachment of 68 men at Fort Lahore)* ..	1868*a*	April 1868, from England ...	813		
17	F. Brig., F. Battery, R. H. Art., Meean Meer	.	March 1868, from Peshawur	136		
18	XIX Brig., F. Battery, R. Art., Meean Meer		March 1864, from Rawulpindee ..	142		
19	XXII Brig., 5 Battery, R. Art., Meean Meer	..	December 1868, from Morar .	72		
20	XXIV Brig., 5 Battery, R. Art., Meean Meer	..	April 1869, from Morar	71		
21	1-6th Regiment, Rawulpindee* .	1868*a*	March 1868, from England .	831		
22	1-19th Regiment, Rawulpindee*	1857*a*	February 1868, from Nowshera .	808		
23	F. Brig., D. Battery, R. H. Art., Rawulpindee .		April 1866, from Peshawur	143		
24	XIX Brig., E. Battery, R. Art., Rawulpindee	.	April 1868, from Peshawur	135		

(*a*) From England. (*b*) From Bombay Presidency.

* These regiments furnished road-making parties in the Hills from April to October, of the following strengths 92nd, 175, 38th, 178, 85th, 150; 1-6th, 224; 1-19th, 224. The 88th Regiment at Nowshera sent also 100 men.

the PUNJAB.

	Total Admissions and Loss of the Year by Death and Invaliding.		Causes of Admissions into Hospital, of Deaths in and out of Hospital, and of the Invaliding of 1869.																												
			Cholera.	Smallpox.	Intermittent Fever.	Remittent and Continued Fevers.	Dysentery.	Diarrhœa.	Erysipelas.	Ophthalmia.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Scurvy.	Anæmia and Debility.	Phthisis Pulmonalis and Hæmoptysis.	Apoplexy, Epilepsy, and Brain Affections.	Neuralgic Affections.	Drunkenness.	Delirium Tremens.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
1	Admissions	618	...	...	107	31	11	38	...	16	26	59	8	...	25	...	1	6	...	2	7	40	7	8	29	36	..	5	26	68	...	7
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
2	Admissions	615	1	...	231	113	14	50	..	52	51	47	41	...	4	11	13	14	...	6	...	27	2	3	26	28	1	9	48	78	...	15
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
3	Admissions	289	...	.	86	8	1	18	...	3	55	14	...	...	...	3	2	4	...	3	1	17	1	6	19	13		8	1	16	...	7
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
4	Admissions	234	...	2	75	11	4	11	...	4	20	15	1	...	3	2	2	4	...	..	3	13	2	2	12	10	...	1	14	19	...	4
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
5	Admissions	2,149	4	1	816	366	56	133	4	16	80	157	8	...	24	17	14	14	..	15	4	121	9	...	40	42	1	15	18	75	..	69
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
6	Admissions	210	...	...	23	45	3	3	...	5	7	24	9	...	8	1	5	4	...	4	...	4	...	...	17	5	2	3	10	20	...	8
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
7	Admissions	1,408	1	10	307	379	17	64	5	30	31	103	9	...	3	2	8	1	...	2	7	57	7	...	33	67	10	8	47	80	...	116
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
8	Admissions	326	...	3	67	34	5	22	...	9	3	27	3	...	3	...	6	1	..	11	...	31	4	3	11	16	1	1	20	34	..	11
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
9	Admissions	1,765	1	...	803	170	27	71	2	11	37	71	6	8	47	9	25	21	...	5	24	41	2	3	25	77	.	6	171	34	...	68
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
10	Admissions	221	...	...	125	7	4	10	...	..	8	11	..	...	...	...	3	1	...	1		10	...	...	2	4	1	2	9	10	...	4
	[illegible]																															
	[illegible]																															
11	Admissions	101	...	...	41	4	1	5	...	...	2	14	1	...	...	...	2	2	...	1	..	9	..	1	1	3	...	1	9	2	...	2
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
12	Admissions	629	...	...	71	174	3	25	2	2	26	30	6	...	...	1	1	17	...	3	9	15	2	2	13	47	...	3	93	63	.	21
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
13	Admissions	1,297	...	...	290	184	40	98	...	45	59	159	18	2	1	2	7	9	...	...	9	118	7	5	29	85	3	7	58	73	..	29
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
14	Admissions	183	...	...	22	25	3	8	...	7	2	15	...	...	7	...	4	2	...	1	4	6	8	1	17	6	6	..	16	21	..	2
	[illegible]																															
	[illegible]																															
15	Admissions	112	6	...	39	2	4	3	...	...	7	5	...	...	2	5	1	...	..	2	1	...	...	3	3	7	..	3	3	11	...	5
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
16	Admissions	2,925	...	6	1,938	168	64	103	3	21	14	146	20	...	3	5	14	26	1	3	4	45	12	4	39	51	3	1	88	58	.	79
	[illegible]																															
	[illegible]	[illegible]																														
17	Admissions	281	...	1	122	17	3	33	...	12	6	5	...	...	2	...	6	3	.	...	..	9	..	1	6	4		.	25	24	..	2
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
18	Admissions	347	...	1	170	12	2	22	1	7	8	13	...	...	9	1	2	...	...	...	.	17	.	...	7	15	.	...	23	30	..	7
	[illegible]	[illegible]																														
	[illegible]																															
19	Admissions	212	...	2	82	33	6	18	...	...	3	6	...	..	4	...	...	...	..	...	2	4	.	2	3	8	..	.	11	22	..	6
	[illegible]	[illegible]																														
	[illegible]																															
20	Admissions	173	...	...	77	19	2	13	1	1	8	2	4	..	3	...	2	3	...	...	...	2	1	1	4	13	...	2	6	5		4
	[illegible]																															
	[illegible]																															
21	Admissions	1,640	..	...	730	424	11	56	2	15	40	102	5	...	16	11	4	...	...	3	18	42	3	..	10	21	1	13	33	50	...	30
	[illegible]																															
	[illegible]	[illegible]																														
22	Admissions	1,605	...	...	568	577	12	41	1	7	37	61	7	.	24	1	2	2	...	...	5	48	2	2	18	15	1	6	52	68	...	18
	[illegible]	[illegible]																														
	[illegible]	[illegible]																														
23	Admissions	421	...	...	219	12	1	7	...	1	7	27	9	...	23	...	...	...	...	3	1	9	...	1	18	22	..	..	15	26	..	20
	[illegible]																															
	[illegible]																															
24	Admissions	576	...	...	247	67	6	28	...	2	8	44	14	1	23	1	1	...	.	1	4	11	...	1	26	10	5	1	11	36	...	28
	[illegible]																															
	[illegible]																															

TABLE

REGIMENTS of the

	REGIMENTS & BATTERIES & STATIONS OF 1869.	Year of arrival in the Bengal Presidency.	Date of arrival from Station previously occupied.	Average Strength during 1869.	[illegible]	Loss per 1,000 By Deaths.	Loss per 1,000 By Invaliding.
25	20th Hussars, Campbellpore, (Detachment at Sydun Bowlie	*b*	December 1864, from Sealkote ...	454	[illegible]	[illegible]	[illegible]
26	XXV Brigade, 4 Battery, R. Art., Attock	...	January 1865, from Allahabad ...	77	[illegible]	..	[illegible]
27	88th Regiment, Nowshera, (Detachment of 100 men at Attock)	1857*a*	December 1868, from Peshawur ...	709	[illegible]	17.32	[illegible]
28	38th Regiment, Peshawur	1864*a*	January 1868, from Shahjehanpore and Moradabad	728	[illegible]	171.70	[illegible]
29	101th Regiment, Peshawur	*b*	December 1868, from Dugshaie ...	683	[illegible]	[illegible]	[illegible]
30	A Brigade, B. Battery, R. H. Art., Peshawur ...	1866*a*	March 1868, from Meean Meer ..	136	[illegible]	[illegible]	[illegible]
31	A. Brigade, E. Battery, R. H. Art., Peshawur ...	1865*a*	March 1868, from Umballa	132	[illegible]	[illegible]	[illegible]
32	XIX Brigade, B. Battery, R. Art., Peshawur ...	...	February 1868, from Rawul Pindee ...	141	[illegible]	[illegible]	[illegible]
33	XXII Brigade, 4 Battery, R. Art., Peshawur ...	...	January 1866, from Meerut	77	[illegible]	[illegible]	[illegible]
	REGIMENTS OF THE PUNJAB			12,312	[illegible]	[illegible]	[illegible]

4.—*REGIMENTS cantoned during*

1	XXV Brigade, 1 Battery, R. Art., Darjeeling ...	...	April 1869, from Saugor	76	[illegible]	[illegible]	[illegible]
2	55th Regiment, Chuckrata*	1864*a*	May 1869, from Lucknow	927	[illegible]	[illegible]	[illegible]
3	XXII Brigade, A. Battery, R. Art., Jutogh ...	...	March 1869, from Allahabad	86	[illegible]	[illegible]	[illegible]
4	1-3rd Regiment, Dugshaie	1867*a*	April 1869, from Meerut	871	[illegible]	[illegible]	[illegible]
5	41st Regiment, Subathoo	1865*a*	February 1869, from Agra	842	[illegible]	[illegible]	[illegible]
6	XXV Brigade, 5 Battery, R. Art., Huzara	...	April 1869, from Abyssinia and Bombay Presidency	81	[illegible]	[illegible]	[illegible]
	HILL STATIONS OF THE BENGAL PRESIDENCY			2,883	[illegible]	[illegible]	[illegible]

5.—*DEPOT and*

1	Chinsurah Depôt			120			
2	Chunar Invalid Garrison			32	[illegible]	[illegible]	

(*a*) From England. (*b*) Reorganised from Local Regiments.

* The Depôt of the 55th was at Rae Bareilly during 1869. Of the 18 deaths here shown, 6 occurred at the Depôt,

PUNJAB,—continued.

	Total Admissions and Loss of the Year by Death and Invaliding.		Causes of Admissions into Hospital, of Deaths in and out of Hospital, and of the Invaliding of 1860.																													
			Cholera.	Smallpox.	Intermittent Fever.	Remittent and Continued Fevers.	Dysentery.	Diarrhœa.	Erysipelas.	Ophthalmia.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Scurvy.	Anæmia and Debility.	Phthisis Pulmonalis and Hæmoptysis.	Apoplexy, Epilepsy, and Brain Affections.	Neuralgic Affections.	Drunkenness.	Delirium Tremens.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
25	Admissions	482	...	...	106	102	6	26	...	2	22	27	14	...	12	5	15	2	1	10	3	9	...	1	7	31	...	7	18	30	...	17
	Deaths	[illegible]																														
	Invaliding	[illegible]																														
26	Admissions	284	...	...	142	55	...	6	..	...	7	14	2	..	1	...	...	4	..	1	1	8	...		8	4	...	...	2	15	..	14
	Deaths	..																														
	Invaliding	5																														
27	Admissions	1,565	3	...	910	168	20	62	3	15	26	57	15	...	14	12	4	9	...	5	5	35	3	4	31	13	2	9	23	19	..	29
	Deaths	[illegible]	2																													
	Invaliding	[illegible]																														
28	Admissions	2,209	181	...	617	826	23	151	...	8	27	68	4	2	1	6	5	1	1	...	6	75	8	1	17	66	1	7	35	14	...	28
	Deaths	[illegible]	112																													
	Invaliding	[illegible]																														
29	Admissions	1,850	104	..	423	855	15	78	...	8	30	63	3	...	5	3	6	7	...	1	13	18	...	2	21	12	3	11	30	38	...	65
	Deaths	[illegible]																														
	Invaliding	[illegible]																														
30	Admissions	385	10	...	81	185	3	16	...	4	5	6	...	...	4	2	...	...	..	...	...	10	1	...	2	9	1	1	18	17	..	10
	Deaths	[illegible]																														
	Invaliding	[illegible]																														
31	Admissions	387	7	1	147	102	2	35	...	2	2	8	3	...	9	3	2	...	..	...	1	2	2	1	4	12	...	4	9	17	...	12
	Deaths	[illegible]																														
	Invaliding	[illegible]																														
32	Admissions	415	17	...	91	111	2	38	...	3	2	20	1	...	10	5	...	1	...	2	1	14	...	...	20	12	...	5	30	21	...	9
	Deaths	[illegible]																														
	Invaliding	[illegible]																														
33	Admissions	179	6	.	45	59	1	15	...	4	1	14	...	1	3	.	1	2	...	...	1	2	...	...	2	7	..	1	2	8	...	4
	Deaths	[illegible]																														
	Invaliding	1																														
	Admissions	26,393	341	27	9,887	5345	372	1290	24	312	673	1434	206	14	293	108	158	160	3	85	134	860	83	58	520	861	42	143	1004	1171	...	780
	Deaths	[illegible]																														
	Invaliding	[illegible]																														

the year at HILL STATIONS.

			Cholera.	Smallpox.	Intermittent Fever.	Remittent and Continued Fevers.	Dysentery.	Diarrhœa.	Erysipelas.	Ophthalmia.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Scurvy.	Anæmia and Debility.	Phthisis Pulmonalis and Hæmoptysis.	Apoplexy, Epilepsy, and Brain Affections.	Neuralgic Affections.	Drunkenness.	Delirium Tremens.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
1	Admissions	69	...	...	6	...	...	3	...	1	2	3	2	...	..	...	18†	5	...	...	...	3	..	...	1	8	...	2	2	10	...	3
	Deaths	[illegible]																														
	Invaliding	[illegible]																														
2	Admissions	773	...	1	52	55	23	47	3	21	38	156	30	...	3	20	4	5	...	3	8	42	4	...	29	55	5	11	26	86	...	46
	Deaths	[illegible]																														
	Invaliding	[illegible]																														
3	Admissions	64	...	...	8	1	..	6	..	...	6	7	...	...	2	...	1	...	...	1	1	6	...	..	8	5	2	.	1	6	...	3
	Deaths	[illegible]																														
	Invaliding	[illegible]																														
4	Admissions	623	...	1	69	15	12	38	3	15	93	141	12	...	2	1	...	1	...	...	1	62	3	...	28	18	1	17	32	45		13
	Deaths	[illegible]																														
	Invaliding	[illegible]																														
5	Admissions	1,081	24	15	112	153	41	50	1	12	42	160	20	1	18	52	2	4	..	2	2	70	31	...	60	47	2	13	45	62	...	54
	Deaths	[illegible]	16			7																										
	Invaliding	[illegible]																														
6	Admissions	95	...	...	15	4	1	4	...	...	9	10	1	...	...	...	...	1	...	...	...	5	1	...	1	8	...	8	3	8	...	7
	Deaths	1																														
	Invaliding	[illegible]																														
	Admissions	2,705	24	17	202	228	77	118	7	49	190	495	71	1	25	73	25	16	...	6	12	188	39	..	127	121	10	51	109	217	...	117
	Deaths	[illegible]																														
	Invaliding	[illegible]																														

INVALID GARRISON.

			Cholera.	Smallpox.	Intermittent Fever.	Remittent and Continued Fevers.	Dysentery.	Diarrhœa.	Erysipelas.	Ophthalmia.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Scurvy.	Anæmia and Debility.	Phthisis Pulmonalis and Hæmoptysis.	Apoplexy, Epilepsy, and Brain Affections.	Neuralgic Affections.	Drunkenness.	Delirium Tremens.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
1	Admissions	267	4	...	19	6	14	18	...	5	18	9	15	4	23	22	8	2	...	2	8	11	1	2	21	4	.	2	14	11	..	21
	Deaths	12	1	..																												
2	Admissions	41	1	...	7	1	2	5	...	..	1	...	...	...	4	...	2	...	3	9	.	...	1	..	2	...	.	...	...	2	...	4
	Deaths	[illegible]																														

† Epileptic Seizures.

and 4 elsewhere away from the Regiment. During the eight months of occupation, 8 deaths occurred at Chuckrata.

6.—CONVALESCENT

	CONVALESCENT DEPOTS.	Period of Occupation.	Average Strength during the period of occupation.	[illegible]	Loss per 1,000 By Deaths	Loss per 1,000 By Invaliding
1	Darjeeling	Eight months, April to November	105	[illegible]	[illegible]	[illegible]
2	Nynee Tal	Eight months, April to November	422	[illegible]	26·07	157·11
3	Landour	Seven months, April to October	212	[illegible]	[illegible]	[illegible]
4	Kussowlie	Seven months, from middle of April to middle of November	395	[illegible]	[illegible]	[illegible]
5	Dhurmsalla	Seven months, April to October	107	[illegible]	[illegible]	[illegible]
6	Murree	Six months, May to October	351	[illegible]	[illegible]	[illegible]
	CONVALESCENT DEPÔTS OF THE BENGAL PRESIDENCY		1,592	[illegible]	[illegible]	[illegible]
	EUROPEAN ARMY OF THE BENGAL PRESIDENCY		34,929†	[illegible]	[illegible]	[illegible]

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* By order of the Army Medical Department, Admissions on account of Drunkenness no longer appear in the Sick Returns, the results of drunkenness being shown
drunkenness was less in 1869

† The Strength here shown exceeds the actual average of the year by 305, which probably represents men in the Depôts of other Presidencies and elsewhere. See note

ANNUAL RELIEF OF

ROYAL ARTILLERY.

A. Brigade	A. Battery	From	Meerut	To Peshawur ...	... Arrived	January	1870.
	B. Battery	„	Peshawur	„ Rawul Pindee ..	... Arrived	February	1870.
	C. Battery	„	Lucknow	„ Meerut ...	... Arrived	January	1870.
	D. Battery	„	Meerut	„ Peshawur ...	.. Arrived	February	1870.
	E. Battery	„	Peshawur	„ Sealkote ...	... Arrived	February	1870.
C. Brigade	F. Battery	„	Benares	„ Umballa ...	... Arrived	February	1870.
F. Brigade	A. Battery	„	Umballa	„ Benares ...	. Arrived	December	1869.
	B. Battery	„	Sealkote	„ Morar ...	.. Arrived	January	1870.
	C. Battery	„	Morar	„ Lucknow ...	... Arrived	December	1869.
	D. Battery	„	Rawul Pindee	„ Meerut ...	... Arrived	March	1870.
8th Brigade	B. Battery	„	Lucknow	„ Dinapore ...	... Arrived	December	1869.
	C. Battery	„	Morar	„ Lucknow ...	.. Arrived	February	1870.
	H. Battery	„	Agra	„ Meean Meer ...	... Arrived	January	1870.
16th Brigade	B. Battery	„	Meerut	„ Barrackpore ...	... Arrived	January	1870.
	C. Battery	„	Barrackpore	„ Morar ...	... Arrived	March	1870.
	F. Battery	„	Dinapore	„ Meerut ...	... Arrived	February	1870.
19th Brigade	C. Battery	„	Meerut	„ Mooltan ...	... Arrived	January	1870.
	D. Battery	„	Mooltan	„ Meerut ...	... Arrived	March	1870.
	F. Battery	„	Meean Meer	„ Agra ...	... Arrived	January	1870.
22nd Brigade	4. Battery	„	Peshawur	„ Govindghur ...	... Arrived	January	1870.
	5. Battery	„	Meean Meer	„ Ferozepore ...	... Arrived	January	1870.
24th Brigade	1. Battery	„	Mooltan	„ Delhi ...	... Arrived	December	1869.
	4. Battery	„	Allahabad	„ Darjeeling ...	... Arrived	December	1869.
	6. Battery	„	Govindgurh	„ Attock ...	... Arrived	November	1869.
25th Brigade	1. Battery	„	Darjeeling	„ Allahabad ...	... Arrived	January	1870.
	2. Battery	„	Delhi	„ Mooltan ...	... Arrived	December	1869.
	4. Battery	„	Attock	„ Peshawur ...	... Arrived	November	1869.

XVI.—(*continued*).

DEPOTS.

	Total Admissions, and Loss of the Year by Death and Invaliding.	Cholera.	Smallpox.	Intermittent Fever.	Remittent and Continued Fever.	Dysentery.	Diarrhœa.	Erysipelas.	Ophthalmia.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Scurvy.	Anæmia and Debility.	Phthisis Pulmonalis and Hæmoptysis.	Apoplexy, Epilepsy, and Brain Affections.	Neuralgic Affections.	Drunkenness.*	Delirium Tremens.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Functional Derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
		Causes of Admissions into Hospital, of Deaths in and out of Hospital, and of the Invaliding of 1869.																													
1	Admissions 190	...	...	47	7	7	7	2	2	30	9	2	...	1	4	1	15	..	...	1	13	2	..	4	5		3	5	6	...	16
	Deaths ... 1	...		...	..				..							2				1				1							
	Invaliding ... 20			1		3				1		1		[illegible]	[illegible]						[illegible]			1							[illegible]
2	Admissions 680	...	...	103	29	9	21	1	13	17	122	57		2	15	3	3	..	..	3	14	.	1	80	91	4	10	23	25		25
	Deaths ... [illegible]	.	.		..	1		..							[illegible]		..							[illegible]		2					[illegible]
	Invaliding ... [illegible]	...		1		[illegible]				1		[illegible]		[illegible]	[illegible]					2								1			[illegible]
3	Admissions 272	.		58	4	7	20	1	1	6	6	28	...	5	20	6	4			3	11	2	13	27	12	1	2	13	9		13
	Deaths ... 1					2																									[illegible]
	Invaliding ... [illegible]	.		[illegible]	[illegible]	2	[illegible]			[illegible]		[illegible]		[illegible]	[illegible]	[illegible]				[illegible]				[illegible]	[illegible]		[illegible]		[illegible]		
4	Admissions 309			57	13	15	23		15	53	15	10	..	15	7	7	3	1		9	22	9	5	27	32	1	3	20	14	.	14
	Deaths ... [illegible]	.			1	2							...		2	1			..	[illegible]		[illegible]		[illegible]		1			[illegible]		
	Invaliding ... [illegible]				1	[illegible]	..		[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]			1		[illegible]		[illegible]			[illegible]		[illegible]		[illegible]
5	Admissions 191		..	10	25	7	46	..	2	5	4	.	.	1	...	2	1		1	2	8			17	12		1	6	10		4
	Deaths ... 1			..	[illegible]	1			..					[illegible]																	
	Invaliding ... 41	..		..	[illegible]	2	1		.	[illegible]		.		[illegible]						[illegible]	...	..		[illegible]	.		[illegible]	[illegible]	[illegible]		
6	Admissions 358		..	10	82	12	41	.	5	22	25	1	.	20	5	1	1		...	1	11	..		10	15	3	3	9	12	.	30
	Deaths ... 1													[illegible]	1				...												
	Invaliding ... [illegible]			[illegible]	[illegible]			.	1					[illegible]			[illegible]						[illegible]								
	Admissions 2,080	...	.	315	160	57	158	4	38	133	181	107	...	44	51	23	27	1	1	19	79	13	19	174	167	9	22	76	76	...	105
	Deaths ... [illegible]	.			[illegible]	[illegible]										[illegible]				[illegible]				[illegible]		[illegible]			[illegible]		
	Invaliding ... [illegible]			[illegible]	[illegible]	[illegible]	[illegible]		[illegible]			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]
	Admissions 59,208	876	129	16,890	9076	1638	[illegible]	63	887	1766	6371	707	20	757	116	191	302	70	238	291	1981	266	138	1809	2,324	108	508	2890	3112	..	1850
	Deaths ... [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]			[illegible]		[illegible]
	Invaliding ... [illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]			[illegible]

under the headings Dyspepsia, Continued Fever, &c. The Admissions from Ebriositas amounted in 1867 to 688 and in 1868 to 702, and there is no reason to believe that than in either of these years.

xed to this Table and Notes appended to Table XIII. For the Army of the Presidency the ratios shown in Table I are to be accepted as the proper ratios of the year.

THE ARMY, 1869-70.

CAVALRY REGIMENTS.

5th Lancers	From Lucknow	To Sealkote	... Arrived	February 1870
7th Hussars	„ Sealkote	„ England	... Marched	January 1870.
19th Hussars	„ Benares & Cawnpore	„ England	... Marched	January 1870.
20th Hussars	„ Campbellpore	„ Umballa	... Arrived	March 1870.
21st Hussars	„ Umballa	„ Lucknow	... Arrived	December 1869.

INFANTRY REGIMENTS.

2-1st Regiment	From Nusseerabad	„ Jhansi	... Arrived	January 1870.
1-5th Regiment	„ Ferozepore	„ Peshawur	... Arrived	January 1870
1-7th Regiment	„ Saugor	„ Aden	... Marched	December 1869.
1-11th Regiment	„ Fyzabad	„ Morar	... Arrived	November 1869.
1-14th Regiment, Detachment of 130 men.	„ Cawnpore	„ Allahabad	... Arrived	December 1869.
1-17th Regiment	„ England	„ Lucknow	... Arrived	March 1870.
1-19th Regiment	„ Rawul Pindee	„ Saugor	... Arrived	January 1870.
1-19th Regiment	„ Madras Presidency	„ Fort William	... Arrived	December 1869.
26th Regiment	„ Fort William	„ Fyzabad	... Arrived	January 1870.
36th Regiment	„ Peshawur	„ Rawul Pindee	... Arrived	November 1869
38th Regiment	„ Sealkote	„ Peshawur	... Arrived	November 1869
39th Regiment	„ England	„ Ferozepore	... Arrived	November 1869.
58th Regiment	„ Allahabad	„ Sealkote	... Arrived	February 1870.
77th Regiment	„ Agra	„ England	.. Marched	February 1870.
79th Regiment	„ Roorkee & Delhi	„ Kamptee	... Marched	November 1869.
88th Regiment	„ Nowshera	„ Agra	... Arrived	March 1870.
93rd Regiment	„ Jhansi	„ England	. Marched	December 1869.
102nd Regiment	„ Lucknow	„ England	... Marched	February 1870.
103rd Regiment	„ Morar	„ Roorkee and Delhi	Arrived	December 1869.
104th Regiment	.. Peshawur	„ Nowshera	. Arrived	January 1870.

EUROPEAN TROOPS, 1869.

XVII.

TABLE showing the SICKNESS and MORTALITY among the WOMEN of the EUROPEAN REGIMENTS serving in the BENGAL PRESIDENCY during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths in each month.	Death-rate of the year per 1,000 of Strength.	CAUSES OF DEATHS.													
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Heat Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Phthisis Pulmonalis.	Respiratory Diseases.	Heart Diseases.	Atrophy and Anæmia.	Childbirth and Abortion.	All other Causes.
January	3,477	91	2·62	3	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...
February	3,495	89	2·55	3	...	...	...	...	...	...	...	...	...	1	...	...	...	1	1
March	3,684	120	3·26	10	...	2	...	...	3	...	1	1	...	...	...	1	...	2	...
April	3,762	150	4·00	13	...	3	...	...	3	...	1	...	...	2	...	2	...	...	2
May	3,729	214	5·74	16	...	3	1	...	2	2	2	...	...	3	...	...	...	1	2
June	3,678	230	6·25	22	...	4	...	...	6	5	...	...	2	3	1	...	...	1	...
July	3,673	212	5·77	14	...	1	1	...	3	2	1	1	2	...	1	...	...	...	2
August	3,639	305	8·38	40	...	23	...	...	4	...	3	2	...	...	1	2	1	2	2
September	3,629	296	8·18	34	...	19	...	...	5	1	4	3	1	...	1	...	...	...	...
October	3,536	260	7·35	19	...	3	...	...	5	1	2	1	1	2	...	...	1	3	...
November	3,436	240	7·00	12	...	1	...	1	...	...	3	...	1	...	1	2	...	2	1
December	3,491	150	4·30	9	...	...	...	...	3	1	1	1	...	2	1	...	...	...	...
						59	2	1	34	12	18	9	7	16	6	7	2	12	10
						Died per 1,000 of Strength.													
For the year	3,602	196*	5·44	195	54·14	16·38	·55	·28	9·44	3·33	5·01	2·50	1·94	4·44	1·67	1·94	·55	3·33	2·78

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admitted during the year.	Admitted per cent of Strength.	Died per cent. of Admissions.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	...	...	3	6	5	7	2	36	30	3	2	...	94	2·61	62·77
Smallpox	3	3	3	8	3	1	1	...	...	...	...	...	22	·61	9·09
Fever, Intermittent ...	27	18	41	41	16	15	36	82	99	205	270	101	951	26·40	·11
Fever, Remittent and Continued. ...	...	7	15	33	120	185	80	140	101	49	21	13	764	21·21	4·45
Heat Apoplexy ...	...	...	...	..	2	6	3	1	1	1	...	...	14	·39	85·71
Dysentery ...	7	6	12	20	17	13	16	48	31	20	15	11	216	6·00	8·33
Diarrhœa	17	8	19	35	39	22	46	88	37	24	18	9	362	10·05	2·49
Hepatitis	2	4	10	5	7	7	6	11	13	5	11	3	84	2·33	8·33
Spleen Disease ...	3	...	...	...	...	1	...	1	...	...	4	2	11	·30	...
Respiratory Diseases ...	10	11	12	15	15	11	15	14	11	9	14	10	147	4·08	4·08
Phthisis Pulmonalis ...	2	4	5	3	6	7	4	...	5	1	2	2	41	1·14	39·02
Anæmia and Debility ...	22	10	36	42	60	63	29	92	48	33	27	10	472	13·10	·42
Rheumatism ...	7	5	4	6	5	5	9	8	6	3	4	1	63	1·75	...
Eye Diseases ...	5	4	4	35	40	18	19	79	50	20	16	3	293	8·14	...
Childbirth	50	66	77	48	35	55	75	90	89	72	99	57	822	22·82	1·34
Abortion	2	6	9	11	6	6	10	8	7	8	4	...	77	2·14	
Diseases peculiar to women	5	9	12	3	12	15	11	13	10	9	3	4	106	2·94	1·43
Abscess and Ulcer ...	6	8	11	9	11	22	11	14	10	7	8	1	118	3·28	
Injuries	4	2	2	6	8	2	5	1	...	4	7	2	43	1·19	
All other Causes ...	28	28	61	50	70	80	55	82	39	31	25	18	567	15·74	
	200	199	336	370	477	541	433	817	587	504	550	247	5,267		
	Admitted per cent. of the Average Strength in each Month.														
	5·75	5·69	9·12	10·00	12·79	14·71	11·79	22·45	16·17	14·25	16·01	7·08		146·22	

* Calculated on the number remaining sick at the close of each week.

EUROPEAN TROOPS, 1869.

XVIII.

ABLE showing the SICKNESS and MORTALITY among the CHILDREN of the EUROPEAN REGIMENTS serving in the BENGAL PRESIDENCY during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths in each Month.	Death-rate of each month per 1,000 of Strength.	Causes of Deaths. Cholera.	Smallpox.	Measles.	Hooping Cough.	Fever, Intermittent.	Fever, Remittent and Continued.	Heat Apoplexy.	Dentition.	Convulsion.	Meningitis and Hydrocephalus.	Tabes Mesenterica.	Phthisis Pulmonalis.	Dysentery.	Diarrhœa.	Anæmia and Atrophy.	Bronchitis and Pneumonia.	Croup and Diphtheria.	All other Causes.
anuary ...	5,402	101	1·87	12	2·11	...	...	...	...	...	1	...	...	1	1	...	...	2	1	2	1	...	3
ebruary ...	5,553	81	1·46	14	2·46	...	...	...	...	...	...	...	2	2	1	...	...	2	...	...	2	1	4
arch ...	5,829	119	2·04	34	5·98	1	...	1	...	...	1	...	3	2	2	3	..	2	10	6	2	...	1
pril ...	5,976	168	2·81	67	11·78	2	2	8	...	...	10	...	11	9	...	2	...	1	8	8	1	4	1
ay ...	5,887	296	5·03	106	18·64	6	1	5	1	...	14	1	11	23	2	4	...	4	15	6	3	1	9
une ...	5,907	300	5·17	95	16·70	11	1	3	1	...	13	...	11	13	4	3	1	4	18	6	3	1	2
uly ...	5,781	259	4·48	45	7·91	6	...	...	1	...	5	...	2	5	...	1	...	2	10	8	1	2	2
ugust ...	5,721	397	6·94	187	32·87	54	...	1	...	1	6	1	26	13	1	5	...	6	49	13	3	1	7
eptember ...	5,710	401	7·02	104	18·28	27	...	...	...	1	2	...	20	4	3	4	...	9	21	4	5	1	3
ctober ...	5,656	349	6·17	55	9·67	1	...	...	...	5	4	...	9	7	1	5	...	3	9	4	1	4	2
ovember ...	5,421	291	5·36	77	13·54	...	...	...	...	24	1	...	5	13	1	4	...	3	8	7	5	3	3
ecember ..	5,511	171	3·10	30	5·10	...	...	...	...	7	1	...	2	4	...	...	...	2	3	6	1	...	4
						108	4	18	3	38	58	2	102	96	16	31	1	40	152	70	28	18	41
						Died per 1,000 of Strength.																	
For the year ...	5,688	244	4·29	826	145·22	18·99	·70	3·17	·53	6·68	10·20	·35	17·93	16·88	2·81	5·45	·18	7·03	26·72	12·31	4·92	3·17	7·20

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month. Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
holera ...	...	...	3	5	8	11	8	67	39	1	...	...	142	2·50	76·06
mallpox ...	5	7	2	6	4	3	...	...	..	...	...	...	27	·48	14·81
Measles ...	32	7	79	50	30	4	...	...	...	...	...	...	202	3·55	8·91
Hooping Cough ...	13	...	3	5	5	6	...	2	...	1	5	7	47	·83	6·38
Fever, Intermittent ...	28	16	34	19	26	13	31	63	94	197	289	67	877	15·42	4·33
Fever, Remittent and Continued ...	7	13	26	54	120	153	45	80	63	62	35	12	670	11·78	8·66
Heat Apoplexy ...	...	...	...	1	2	...	1	1	...	...	...	...	5	·09	40·00
Dysentery ...	5	3	9	20	22	20	15	31	27	20	13	18	203	3·57	19·70
Diarrhœa ...	22	9	43	87	108	101	81	237	93	49	44	19	893	15·70	17·02
Hepatitis ...	1	...	...	...	...	1	1	3	...	...	...	...	6	·10	...
pleen Disease ...	...	...	...	...	...	1	...	...	...	1	..	3	5	·09	...
Respiratory Diseases ...	20	28	35	38	34	19	25	20	26	30	26	9	310	5·45	14·84
Eye Diseases ...	7	9	15	102	138	38	74	287	162	40	27	4	903	15·88	...
næmia and Debility ...	16	9	28	31	63	49	39	59	33	21	31	21	400	7·03	17·50
ubercular Diseases ...	5	2	6	4	8	5	7	17	14	10	7	3	88	1·55	39·77
Meningitis and Hydrocephalus ...	2	1	4	...	1	4	...	3	2	2	...	...	19	·33	84·21
onvulsion ...	1	2	3	10	25	13	7	17	7	9	16	5	115	2·02	82·61
Dentition ...	6	11	15	32	48	40	21	67	43	22	22	7	334	5·87	30·54
bscess and Ulcer ...	6	4	2	4	6	10	25	7	8	7	3	4	86	1·51	10·65
Injuries ...	3	3	4	5	8	2	10	3	8	2	4	5	57	1·00	
All other Causes ...	19	22	18	21	18	28	33	27	15	16	16	9	242	4·25	
	198	146	320	494	674	521	423	991	634	490	538	193	5,631		
	Admitted per cent. of the Average Strength in each Month.														
	3·67	2·63	5·64	8·27	11·45	8·97	7·32	17·32	11·10	8·66	9·92	3·50	99·00		

EUROPEAN TROOPS, 1869.

XIX.

TABLE showing the DISTRIBUTION by STATIONS of the DEATHS of the WOMEN of EUROPEAN REGIMENTS.

STATIONS.	Average Strength for the period of observation.	Causes of Deaths.														Total Deaths of the Year.	Died per 1,000 of the Average Strength.		
		Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Heat Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Phthisis Pulmonalis.	Respiratory Diseases.	Heart Diseases.	Atrophy and Anæmia.	Childbirth and Abortion.	All other Causes.		A. Cholera.	B. All other Causes.	C. All Causes.
Chinsurah Depôt ...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	..
Fort William	89	...	...	...	...	...	2	...	..	...	...	...	...	...	...	2	...	22·47	22·47
Dum-Dum	53	...	...	...	...	...	...	...	...	...	2	...	...	...	...	2	...	37·74	37·74
Barrackpore	49	1	...	...	...	1	...	1	...	...	...	...	1	...	...	4	20·41	61·22	81·63
Berhampore (8 months) ..	13	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	76·92	76·92
	200	1	...	...	...	1	3	1	...	...	2	...	1	...	...	9	5·00	40·00	45·00
Hazareebaugh	73	...	...	...	1	...	...	...	...	1	...	...	...	...	...	2	...	27·40	27·40
Dinapore	72	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Benares	77	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...
Chunar	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fyzabad (10 months) ...	120	2	...	...	2	...	...	..	1	...	..	...	...	1	...	6	16·67	33·33	50·00
Rae Bareilly (10 months) ...	67	...	..	...	...	1	1	...	...	2	...	...	...	...	...	4		59·70	59·70
Lucknow	313	4	1	...	3	...	...	2	1	1	1	1	...	...	1	15	12·78	35·14	47·92
Seetapore ...	73	1	...	...	...	...	...	...	..	...	...	1	...	..	...	2	13·70	13·70	27·40
Futtehghur	21	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...			...
Cawnpore	122	3	...	..	1	...	3	...	...	...	...	...	...	1	1	9	24·59	49·18	73·77
Allahabad ...	90	5	...	...	1	...	1	1	...	1	...	..	...	...	...	9	55·55	44·45	100·00
	1,001	15	1	..	8	1	5	3	2	5	1	2	...	2	2	47	14·99	31·96	46·95
Shahjehanpore	52	..	...	...	1	...	1	...	...	...	...	...	...	...	...	2	...	38·46	38·46
Bareilly	78	...	...	..	2	...	...	...	..	...	...	...	..	...	...	2	..	25·64	25·64
Moradabad .. .	35	..	...	...	...	...	...	1	...	...	...	...	..	...	...	1	...	28·57	28·57
Roorkee .. .	35	.	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	28·57	28·57
Meerut .. .	191	4	...	...	1	...	1	...	...	2	...	1	..	...	...	9	20·94	26·18	47·12
Delhi	35	..	...	...	...	...	1	..	...	...	...	...	..	...	...	1	...	28·57	28·57
Muttra	56	...	...	...	...	1	...	.	...	...	...	1	.	...	1	3	..	53·57	53·57
	482	4	...	.	4	1	3	1	...	2	...	2	..	...	2	19	8·30	31·12	39·42
Agra	66	1	...	...	1	...	...	...	..	..	...	...	..	...	...	2	15·15	15·15	30·30
Morar* .. .	118	13	...	...	3	4	...	...	...	...	..	1	..	2	...	23	110·17	84·75	194·92
Seepree ...	11	...	...	...	...	...	1	...	1	...	..	...	..	...		2		181·82	181·82
Jhansi ...	58	1	...	...	1	...	...	..	.	...	...	...	...	1	1	4	17·24	51·73	68·97
Nowgong .. .	19	2	...		...	...	.			...	..	...	..	...	..	2	105·26	...	105·26
Saugor	70	7	...	..	...	...	..	...	...	...	...	...	...	...	...	7	100·00	...	100·00
Jubbulpore	62	...	...	...	2	...	1	...	2	1	...	...	1	...	...	7	...	112·90	112·90
	401	24	...	...	7	4	2	...	3	1	...	1	1	3	1	47	59·41	56·93	116·34
Umballa	127	...	...	...	2	...	...	...	...	...	...	...	...	...	...	2	...	15·75	15·75
Jullundur ..	101	...	...	...	5	1	...	...	1	...	...	1	..	2	1	11	...	108·91	108·91
Ferozepore .	94	.	...	...	...	1	...	...	...	...	1	...	...	...	...	2	...	21·28	21·28
Mooltan	104	...	...	...	1	...	1	...	...	...	...	...	...	..	1	3	...	28·85	28·85
Dera Ismael Khan ...	None.	..	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sealkote (10 months)	107	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	9·35	9·35
Umritsur	4	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	250·00	...	250·00
Fort Lahore .. .	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meean Meer ..	127	...	...	...	...	...	1	...	...	1	...	..	...	1	1	4	...	31·50	31·50
Rawul Pindee ...	172	..	...	.	3	1	...	1	...	2	...	...	...	1	1	9	...	52·33	52·33
Campbellpore ..	38	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attock	5	...	...	1	...	...	...	...	...	..	...	...	...	...	...	1	...	200·00	200·00
Nowshera ...	54	1	...	...	. .	1	1	..	...	1	..	...	...	1	...	5	18·52	74·07	92·59
Peshawur	134	12	...	...	2	1	1	2	...	1	1	...	...	2	...	22	89·55	74·63	164·18
	1,050	11	...	1	13	5	5	3	1	5	2	1	...	7	4	61	13·33	44·77	58·10
Darjeeling ...	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nynee Tal (8 months)	35	..	...	..	...	...	...	...	1	...	...	...	...	...	...	1	...	28·57	28·57
Landour (7 months) ...	22	...	...	...	...	...	...	...	...	...	..	..	...	...	..	...	...	...	...
Chuckrata (8 months)	37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jutogh (7 months)	6	...	...	...	...	...	...	..	..	..	...	...	...	...	.	...	...	...	...
Subathoo (10 months)	85	1	...	...	1	...	.	...	...	...	..	..	...	..	...	2	11·76	11·76	23·53
Dugshaie (10 months)	94	...	...	...	1	...	...	..	.	...	1	...	...	...	...	2	...	21·28	21·28
Kussowlie (8 months) ..	29	.	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...
Kangra	5	...	1	...	...	...	...	..	...	...	...	..	...	...	...	1	...	200·00	200·00
Dhurmsalla (7 months)	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Road-making Detachments (5 months) ..	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree Depôt and Family Camp (6 months)	110		..	...	...	...	...	1	...	2	...	1	...	...	..	4	...	36·36	36·36
	337	1	1	.	2	...	...	1	1	2	1	1	...	...	...	10	2·97	26·70	29·67†
Troops on the march ...	..	.		.		..	. .		...	.	. .	...	...	..	1	1	...	...	...
Bengal Presidency ...	3,602	59	2	1	31	12	18	9	7	16	6	7	2	12	10	195	16·38	37·76	54·14

* Including Gwalior Fortress.

† Calculated on the Average Strength for 12 months.

EUROPEAN TROOPS, 1869.

XX.

TABLE showing the DISTRIBUTION by STATIONS of the DEATHS of the CHILDREN of EUROPEAN REGIMENTS.

STATIONS.	Average Strength for the period of observation.	Causes of Deaths.																		Total Deaths of the Year.	Died per 1,000 of Strength.		
		Cholera.	Smallpox.	Measles.	Hooping Cough.	Fever, Intermittent.	Fever, Remittent and Continued.	Heat Apoplexy.	Dentition.	Convulsion.	Meningitis and Hydrocephalus.	Tabes Mesenterica.	Phthisis Pulmonalis.	Dysentery.	Diarrhœa.	Anæmia and Atrophy.	Bronchitis and Pneumonia.	Croup and Diphtheria.	All other Causes.		A. Cholera.	B. All other Causes.	C. All Causes.
Chinsurah Depôt ...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	1	3	...	...	...
Fort William ...	117	...	...	...	...	1	1	...	...	...	...	...	...	...	1	...	3	...	...	6	...	51·28	51·28
Dum-Dum ...	82	...	...	...	...	...	3	...	3	1	...	...	...	1	...	3	3	...	..	14	...	170·73	170·73
Barrackpore ...	91	...	...	...	...	...	...	...	1	1	...	...	...	3	3	...	...	...	..	8	...	87·91	87·91
Berhampore (8 months) ...	29	...	...	...	...	...	2	...	...	1	...	...	...	...	...	...	...	...	..	3	...	103·45	103·45
	310	...	...	...	...	1	6	...	4	3	...	...	...	4	4	3	6	..	...	31	...	100·00	100·00
Hazareebaugh ...	115	1	...	...	...	...	...	...	...	...	1	..	...	...	...	...	...	..	...	2	8·70	8·70	17·39
Dinapore ...	126	...	...	...	...	...	...	...	1	2	...	...	..	...	2	...	...	...	1	6	...	47·62	47·62
Benares ...	97	...	...	...	...	...	2	...	1	...	...	..	...	1	9	...	1	..	...	14	...	144·33	144·33
Chunar ...	3	...	...	...	...	...	...	...	...	..	...	..	...	...	...	...	...	...	...	...	...	...	...
Fyzabad (10 months) ...	213	1	...	...	...	...	1	...	4	2	1	5	...	...	4	2	1	1	2	24	4·70	107·98	112·68
Rae Bareilly (10 months) ...	142	...	...	...	..	1	...	...	3	...	...	...	...	...	...	...	...	...	...	4	..	28·17	28·17
Lucknow ...	515	31	2	...	..	...	1	...	17	6	...	2	...	2	15	6	...	6	2	90	60·20	114·56	174·76
Seetapore ...	98	1	...	...	...	...	1	...	1	1	1	...	...	...	...	...	...	...	.	5	10·20	40·82	51·02
Futtehghur ...	61	...	...	..	...	...	...	...	...	1	...	...	...	1	...	.	...	...	...	2	...	30·22	30·22
Cawnpore ...	148	2	1	...	..	...	5	1	4	4	1	2	...	...	5	11	1	..	1	38	13·51	243·25	256·76
Allahabad ...	172	14	...	...	...	...	3	...	10	2	...	...	...	...	5	4	...	1	...	39	81·40	145·34	226·74
	1,625	50	3	..	...	1	13	1	41	18	4	9	...	4	40	23	3	8	6	224	30·77	107·08	137·85
Shahjehanpore ...	77	...	...	...	...	...	1	...	...	...	...	...	...	1	3	...	...	...	1	6	...	77·92	77·92
Bareilly ...	144	1	...	...	...	...	2	...	4	1	...	...	...	1	7	1	...	1	...	18	6·94	118·06	125·00
Moradabad ...	47	...	...	...	...	...	1	...	...	...	1	1	...	...	1	...	1	...	1	6	...	127·66	127·66
Roorkee ...	48	...	...	...	...	...	1	...	.	.	1	...	...	...	...	..	...	...	1	3	...	62·50	62·50
Meerut ...	304	2	1	...	...	...	...	...	11	2	1	4	..	5	11	3	2	1	2	45	6·58	141·45	148·03
Delhi ...	50	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	..	3	...	60·00	60·00
Muttra ...	84	...	...	...	...	...	...	...	5	..	...	...	...	...	2	...	...	...	...	7	..	83·33	83·33
	754	3	1	...	...	...	5	...	20	3	3	5	...	7	27	4	3	2	5	88	3·98	112·73	116·71
Agra ...	97	...	...	...	...	...	1	...	3	...	...	...	...	...	...	1	...	...	2	7	...	72·17	72·17
Morar ...	203	16	...	6	...	...	5	1	3	5	...	2	..	2	6	3	...	1	1	51	78·82	172·41	251·23
Seepree ...	14	2	...	...	...	...	1	...	...	...	...	..	...	...	1	2	...	...	...	6	142·86	285·71	428·57
Jhansi ...	100	2	...	...	...	...	4	...	1	2	...	...	...	2	10	2	2	...	3	28	20·00	260·00	280·00
Nowgong ...	32	...	...	...	...	1	...	..	1	.	3	1	...	...	2	...	1	2	...	11	...	343·75	343·75
Saugor ...	110	8	...	...	..	2	...	...	1	6	...	2	1	2	5	2	...	..	...	29	72·72	190·92	263·64
Jubbulpore ...	101	1	...	...	...	2	..	...	3	9	1	..	...	5	9	4	1	...	2	37	9·90	356·44	366·34
	657	29	..	6	...	5	11	1	12	22	4	5	1	11	33	14	4	3	8	169	44·14	213·09	257·23
Umballa ...	217	...	...	...	...	1	...	..	1	1	...	...	...	...	4	2	.	.	...	9	..	41·48	41·48
Jullundur ...	143	...	...	...	...	..	4	...	...	10	...	...	...	...	6	4	1	..	1	26	..	181·82	181·82
Ferozepore ...	158	...	...	.	...	.	...	...	7	3	...	...	...	...	5	..	...	...	1	16	...	101·26	101·26
Mooltan ...	156	...	.	5	..	..	5	...	1	5	...	1	...	...	...	5	3	3	.	28	...	179·49	179·49
Dera Ismael Khan ...	None	...	..	...	.	...	...	..	...	...	...	...	..	...	...	...	...	.	...	..	...	..	.
Sealkote (10 months) ...	197	...	...	..	...	...	3	...	2	3	2	2	...	...	...	1	2	..	1	16	...	81·22	81·22
Umritsur ...	4	...	...	...	...	...	...	...	...	...	...	.	...	...	...	.	..	..	...	...	...	...	...
Fort Lahore ...	2	...	.	...	..	...	...	...	...	...	..	...	...	...	..	...	...	..	...	...	...	...	...
Meean Meer ...	167	...	...	...	...	2	...	..	...	6	...	...	...	1	9	...	...	..	1	19	...	113·77	113·77
Rawul Pindee ...	216	...	...	...	...	8	2	..	2	7	...	...	...	...	11	1	1	...	2	34	...	157·41	157·41
Campbellpore ...	43	...	...	...	...	1	...	...	...	..	...	...	...	...	...	..	...	..	...	1	...	23·26	23·26
Attock ...	8	...	...	...	...	...	...	...	...	...	...	...	...	..	..	..	..	..	.	...	...	.	...
Nowshera ...	84	2	...	...	...	3	1	...	1	3	...	1	...	2	2	3	.	..	...	18	23·81	190·48	214·29
Peshawur ...	193	22	...	...	...	13	4	...	4	2	1	...	...	1	2	2	.	...	2	53	113·99	160·62	274·61
	1,564	24	...	5	..	28	19	...	18	40	3	4	...	4	39	18	7	3	8	220	15·35	125·31	140·66
Darjeeling ...	41	...	...	...	...	..	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...
Nynee Tal (8 months) ...	67	...	.	...	...	...	...	.	...	...	...	...	...	...	...	...	...	..	...	...	...	..	...
Landour (7 months) ...	49	...	...	...	...	...	..	...	...	...	...	1	...	..	...	..	...	..	...	1	..	20·41	20·41
Chuckrata (8 months) ...	54	...	...	...	...	...	...	...	...	...	..	..	..	1	..	..	...	...	...	1	...	18·52	18·52
Jutogh (7 months) ...	13	...	...	...	...	...	...	...	1	...	...	..	...	...	...	...	...	...	..	1	..	76·92	76·92
Subathoo (10 months) ...	125	2	...	7	..	...	...	...	1	6	1	2	..	5	4	2	...	..	8	38	16·00	288·00	304·00
Dugshaie (10 months) ...	131	...	...	...	...	...	3	...	...	..	...	...	...	1	...	...	2	.	...	6	..	45·80	45·80
Kussowlie (8 months) ...	50	...	...	...	...	...	1	...	1	...	...	.	...	1	1	...	...	...	...	4	.	80·00	80·00
Kangra ...	10	...	...	...	...	...	...	...	...	1	1	...	...	...	1	1	...	..	.	4	...	400·00	400·00
Dhurmsalla (7 months) ...	None	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Road-making Detachments (5 months) ...	7	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...
Murree Depôt and Family Camp (6 months) ...	211	...	...	...	3	...	...	...	2	2	...	3	...	...	...	2	1	2	1	16	...	75·83	75·83
	584	2	...	7	3	...	4	...	5	9	2	6	...	8	6	5	3	2	9	71	2·72	87·08	89·80*
Troops on the march ...	...	...	...	...	...	3	...	...	2	..	...	2	...	2	3	3	1	...	4	20	...	...	...
Bengal Presidency ...	5,688	108	4	18	3	38	58	2	102	96	16	31	1	40	152	70	28	18	41	828	18·99	126·23	145·22

* The ratio for 7 months from April to October, and the equivalent of 66 deaths during these months out of a Strength of 735.

EUROPEAN TROOPS, 1869.

XXI.

TABLE showing the DISTRIBUTION by STATIONS of the CHOLERA of the WOMEN of EUROPEAN REGIMENTS.

STATIONS.	Average Strength for the period of observation.	Number of Admissions from Cholera in each Month.												Total Admissions of the year.	Deaths of the year.	Death-rate per 1,000 of Strength.
		Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Augt.	Sept.	Oct.	Nov.	Dec.			
Chinsurah Depôt	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fort William	69	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dum-Dum	69	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Barrackpore	49	...	...	...	1	...	...	...	...	...	...	...	...	1	1	20·41
Berhampore (8 months)	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	200	...	...	...	1	...	...	...	...	...	...	...	...	1	1	5·00
Hazareebaugh	73	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dinapore	72	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chunar	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Benares	77	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fyzabad (10 months)	120	...	...	...	...	...	...	...	2	1	...	...	...	3	2	16·67
Rae Bareilly (10 months)	67	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lucknow	313	...	...	1	...	...	...	...	7	...	...	...	...	8	4	12·78
Seetapore	73	...	...	...	1	...	...	...	...	...	...	...	...	1	1	13·70
Futtehghur	21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cawnpore	123	...	...	...	...	...	1	1	2	...	...	...	...	4	3	24·59
Allahabad	90	...	...	2	2	1	4	...	1	...	...	...	...	10	5	55·55
	1,001	...	...	3	3	1	5	1	12	1	...	...	...	26	15	14·99
Shahjehanpore	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bareilly	78	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Moradabad	35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Roorkee	35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meerut	191	...	...	...	...	...	...	...	...	4	...	1	...	5	4	20·94
Delhi	35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Muttra	56	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	482	...	...	...	...	...	...	...	...	4	...	1	...	5	4	8·30
Agra	66	...	...	...	...	...	1	...	...	...	...	...	...	1	1	15·15
Morar	118	...	...	...	1	2	1	...	10	2	2	...	...	18	12	110·17
Gwalior Citadel		...	...	...	...	1	...	...	...	...	...	...	...	1	1	
Seepree	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jhansi	58	...	...	...	...	...	...	...	1	...	...	...	...	1	1	17·24
Nowgong	19	...	...	...	...	...	...	...	2	...	...	...	...	2	2	105·26
Saugor	70	...	...	...	...	1	...	1	11	...	...	...	...	13	7	100·00
Jubbulpore	62	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...
	404	...	...	...	2	4	2	1	24	2	2	...	...	37	24	59·41
Umballa	127	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jullundur	101	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ferozepore	94	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mooltan	104	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dera Ismael Khan	None.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sealkote (10 months)	107	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Umritsur	4	...	...	...	...	...	...	...	...	1	...	...	...	1	1	...
Fort Lahore	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meean Meer	127	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rawul Pindee	172	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Campbellpore	33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attock	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowshera	54	...	...	...	...	...	...	...	...	1	...	...	...	1	1	18·52
Peshawur	134	...	...	...	...	...	...	...	...	19	1	1	...	21	12	89·55
	1,050	...	...	...	...	...	...	...	...	21	1	1	...	23	14	13·33
Darjeeling	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nynee Tal (8 months)	35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Landour (7 months)	22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chuckrata (8 months)	37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jutogh (7 months)	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Subathoo (10 months)	85	...	...	...	...	...	...	...	...	2	...	...	...	2	1	11·76
Dugshaie (10 months)	94	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kussowlie (8 months)	29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kangra	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dhurmsalla (7 months)	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Road-making Detachments (8 months) ...	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree Depôt and Family Camp (6 months)	110	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	337	...	...	...	...	...	...	...	...	2	...	...	...	2	1	2·97
Troops on the march	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bengal Presidency	3,602	...	...	3	6	5	7	2	30	30	3	2	...	94	59	16·38

EUROPEAN TROOPS, 1869.

XXII.

TABLE showing the DISTRIBUTION by STATIONS of the CHOLERA of the CHILDREN of EUROPEAN REGIMENTS.

STATIONS.	Average Strength for the period of observation.	Number of Admissions from Cholera in each Month.												Total Admissions of the year.	Deaths of the year.	Death-rate per 1,000 of Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Augt.	Sept.	Oct.	Nov.	Dec.			
Chinsurah Depôt	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fort William	117	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dum-Dum	82	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Barrackpore	91	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Berhampore (8 months)	29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	310	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hazareebaugh	115	...	...	...	...	...	...	...	...	...	1	..	...	1	1	8·70
Dinapore	126	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chunar	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Benares	97	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fyzabad (10 months)	213	...	...	...	...	...	...	...	...	1	...	...	...	1	1	4·70
Rae Bareilly (10 months)	142	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lucknow	515	...	...	...	...	...	1	1	34	...	...	...	...	36	31	60·20
Seetapore	98	...	...	...	1	...	...	...	...	...	...	...	...	1	1	10·20
Futtehghur	51	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cawnpore	148	...	...	...	...	...	...	2	1	...	...	...	...	3	2	13·51
Allahabad	172	...	...	3	3	5	7	...	3	...	...	...	...	21	14	81·40
	1,626	...	...	3	4	5	8	3	38	1	1	...	...	63	50	30·77
Shahjehanpore	77	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bareilly	144	...	...	...	...	...	...	...	1	...	...	...	...	1	1	6·94
Moradabad	47	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...
Roorkee	48	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meerut	304	...	...	...	...	...	...	...	...	3	...	...	...	3	2	6.58
Delhi	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Muttra	84	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	754	...	...	...	...	...	...	...	1	3	...	...	...	4	3	3·98
Agra	97	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Morar	193	...	...	...	1	3	2	2	12	...	...	...	...	20	15	} 78·82
Gwalior Citadel	10	...	...	...	...	...	1	...	...	...	...	...	...	1	1	
Seepree	14	...	...	...	...	...	...	1	1	...	...	...	...	2	2	142·86
Jhansi	100	...	...	...	...	...	...	...	2	...	...	...	...	2	2	20·00
Nowgong	32	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...
Saugor	110	...	...	...	...	...	...	1	11	...	...	...	...	12	8	72·72
Jubbulpore	101	...	...	...	...	...	...	1	...	...	...	..	...	1	1	9·90
	657	...	...	...	1	3	3	5	26	...	...	...	...	38	29	44·14
Umballa	217	...	...	...	...	...	...	..	...	...	...	..	...	...	...	...
Jullundur	143	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ferozepore	158	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mooltan	156	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dera Ismael Khan	None.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sealkote (10 months)	197	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...
Umritsur	4	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...
Fort Lahore	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meean Meer	107	...	...	...	...	...	...	..	..	..	...	...	...	...	...	...
Rawul Pindee	216	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Campbellpore	43	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...
Attock	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowshera	84	...	...	...	...	...	...	...	...	2	...	...	...	2	2	23·81
Peshawur	193	...	...	...	...	...	...	...	...	33	...	...	...	33	22	113·99
	1,564	...	...	...	...	...	...	...	...	35	...	...	...	35	24	15·35
Darjeeling	41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nynee Tal (8 months)	67	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...
Landour (7 months)	40	...	..	...	..	..	...	...	...	...	...	...	...	...	...	...
Chuckrata (8 months)	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jutogh (7 months)	13	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...
Subathoo (10 months)	125	...	...	...	...	...	...	...	2	...	...	...	...	2	2	16·00
Dugshale (10 months)	131	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kussowlie (8 months)	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kangra	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dhurmsalla (7 months)	None.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Road-making Detachments (5 months) ...	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree Depôt and Family Camp (6 months)	211	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	564	...	...	...	...	...	...	...	2	...	...	...	..	2	2	3·55
On the march	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bengal Presidency	5,688	...	...	3	5	8	11	8	67	39	1	...	...	142	108	18·99

EUROPEAN TROOPS, 1869.

XXIII.

DETAIL of the ADMISSIONS and DEATHS of the WOMEN and CHILDREN of EUROPEAN REGIMENTS.

WOMEN.

AVERAGE STRENGTH, 3,602.
Admitted during the year ... 5,267. Per cent. of Strength ... 146·22
Died ... ... 195. Per 1,000 of Strength ... 54·14

CAUSES OF ADMISSIONS AND DEATHS.	Admitted.	Died.	Admitted per cent. of Strength.	Died per 1,000 of Strength.
Cholera ...	94	59	2·61	16·38
Variola ...	22	2	·61	·55
Varicella ...	2	...	...	...
Morbilli ...	6	...	...	...
Tonsillitis ...	40	...	...	...
Influenza ...	2	...	...	...
Parotitis ...	3	...	...	...
Febris, Intermittens ...	951	1	26·40	·28
„ Remittens et Continua	764	34	21·21	9·44
Ophthalmia ...	293	...	8·14	...
Erysipelas ...	6	...	...	...
Anthrax ...	2	...	..	...
Dysenteria ...	216	18	6·00	5·01
Diarrhœa ...	362	9	10·05	2·50
Rheumatismus ...	63	...	1·75	...
Syphilis Secundaria ...	14	1	...	...
Ebriositas ...	1	...	...	...
Scabies ...	1	...	...	...
Vermes ...	1	...	...	...
„ Dracunculus ...	1	.	...	...
„ Tænia ...	4	...	...	...
Anæmia ...	181	...	...	...
Anasarca ...	2	1	...	...
Scrofula ...	3	...	...	...
Phthisis Pulmonalis ...	31	16	1·14	4·44
Hæmoptysis ...	7	...		
Insolatio ...	14	11	·39	3·33
Apoplexia ..	2	1	...	...
Paralysis ..	4	...	...	...
Epilepsia ...	6	...	...	...
Hysteria ...	18	...	...	...
Delirium Tremens ...	4	1	...	...
Mania ..	2	...	..	...
Melancholia ...	1	...	..	..
Dementia ...	4	...	...	...
Cephalæa ...	6	...	...	...
Neuralgia ...	28	...	...	...
Dysecœa ...	1	...	...	...
Otitis ...	3	...	..	..
Morbus Cordis ...	25	7	...	1·94
Palpitatio ...	6	...	...	...
Epistaxis ...	2	...	...	...
Varix ...	2	...	...	...
Bronchitis ..	94	2	4·08	1·67
Pleuritis ...	6	1		
Pneumonia ...	6	3		
Asthma ...	1	...		
Gastritis ...	5	1	...	...
Enteritis ...	2	1	..	...
Peritonitis ...	3	1	..	...
Hernia ...	1	...	..	...
Obstipatio ...	14	...	...	...
Dyspepsia ...	270	.	...	...
Colica ..	45	..	...	...
Hæmorrhois ...	15	...	...	...
Melæna ...	1	1	..	...
Hæmatemesis .	3	..	..	..
Ileus ..	1	1	...	...
Splenitis ..	11	...	·30	..
Hepatitis ...	84	7	2·33	1·94
Icterus ...	11	...	...	...
Ascites .	1	...	...	...
Nephritis ...	1	...	...	..
Ischuria ...	2	...	...	...
Enuresis ...	1	...	...	...
Diabetes ...	1	...	...	...
Leucorrhœa ...	18	...	2·04	...
Menorrhagia ...	39	...		
Dysmenorrhœa ..	7	...		
Amenorrhœa ...	10	...		
Hysteritis ...	6	...		
Uterine Ulcer ..	9	..		
Uterine Cancer ...	3	1		
Polypus of Uterus ...	1	...		
Prolapse of Uterus ...	8	...		
Ovaritis ...	4	...		
Ovarian Tumour ...	1	...		
Childbirth ...	822	9	22·82	3·33
Abortion ...	77	3	2·14	
Synovitis ...	5	...	...	...
Contraction ...	2	...	...	..
Skin Diseases ..	9	...	...	...
Phlegmon and Abscess ...	79	..	3·28	...
Ulcer ...	39	...		
Tumour ..	3	...	..	...
Debility ...	291	2	13·10*	·55
Injuries ...	43	...	1·19	...
Cause not ascertained	...	1	...	...
Ratio for all causes not specially calculated .	...	..	15·74	2·78
	5,267	195	146·22	54·14

With Anæmia.

CHILDREN.

AVERAGE STRENGTH, 5,688.
Admitted during the year ... 5,631. Per cent. of Strength ... 99·00
Died ... ... 826. Per 1,000 of Strength ... 145·22

CAUSES OF ADMISSIONS AND DEATHS.	Admitted.	Died.	Admitted per cent. of Strength.	Died per 1,000 of Strength.
Cholera ...	142	108	2·50	18·99
Variola ...	27	4	·48	·70
Varicella ...	5	...	...	...
Morbilli ...	202	18	3·55	3·17
Scarlatina ...	4	1	...	...
Parotitis ...	8	...	...	...
Tonsillitis ...	39	...	...	...
Influenza ...	8	...	...	...
Diphtheria ...	6	4	...	3·17
Cynanche Trachealis ...	28	14	...	
Pertussis ...	47	3	·83	·53
Febris, Intermittens ...	877	38	15·42	6·68
„ Remittens et Continua..	670	58	11·78	10·20
Ophthalmia ...	903	...	15·88	...
Erysipelas ...	1	...	...	...
Dysenteria ...	203	40	3·57	7·03
Diarrhœa ...	893	152	15·70	26·72
Rheumatismus ...	14	...	...	..
Syphilis Secundaria ...	3	2	...	...
Hydrophobia ...	1	1	...	...
Scorbutus ...	1	1	...	...
Rachitis ...	1	...	...	...
Aphtha ...	6	2	...	...
Scabies ...	3	...	...	...
Vermes ...	12	...	...	...
„ Tænia ...	27	...	...	...
Anæmia et Atrophia ...	400	70	7·03	12·31
Cancrum Oris ...	1	1	...	.
Hæmorrhage from Gums ...	2	2	...	...
Anasarca ...	1	1	...	...
Scrofula ...	16	2	1·55	5·98
Phthisis Pulmonalis ...	4	1		
Tabes Mesenterica ...	60	31		
Morbus Coxæ ...	8	4		
Meningitis ...	8	7	·33	2·81
Hydrocephalus ...	11	9		
Convulsio ...	115	96	2·02	16·88
Epilepsia ...	8	2	...	...
Trismus ...	2	2	...	...
Hysteria ...	1	...	...	...
Imbecillitas ...	3	...	...	...
Insolatio ...	5	2	·09	·35
Paralysis ...	2	...	...	...
Neuralgia ..	1	...	...	...
Otitis ...	6	...	...	...
Pericarditis ...	1	...	...	...
Epistaxis ...	1	...	...	...
Bronchitis ...	220	21	5·45†	4·92
Pneumonia ...	17	7		
Stomatitis ..	5	1	...	...
Enteritis ...	27	12	...	...
Peritonitis ...	2	2	...	...
Hernia ...	2	...	...	...
Obstipatio ...	8	...	...	...
Dyspepsia ..	11	.	...	...
Colica ...	10	...	...	...
Hæmorrhois ...	2	..	...	...
Prolapsus Ani ...	3		...	...
Splenitis ...	5	...	·09	...
Hepatitis ...	6	...	·10	.
Icterus ...	5	...	...	...
Ischuria ...	1		.	...
Cystitis ...	2	...	...	
Calculus Vesicæ .	1	...	...	...
Lithotomy ...	1	...	...	...
Hydrocele ...	1	...	...	...
Vaginitis .	1	..	...	...
Amenorrhœa ...	1	...	...	...
Partus ...	1	...	...	...
Synovitis ..	6	...	...	...
Skin Diseases ..	24	...	...	...
Boil ...	35	...	1·51	...
Abscess ...	25	3		
Ulcer ...	26	...		
Tumour ...	1	...	...	...
Dentition	334	102	5·87	17·93
Clubfoot ...	2	...	...	...
Strabismus ...	2	...	...	...
Injuries ...	57	3	1·00	...
Drowned ..	...	1	...	...
Cause not ascertained ...	...	1	...	...
Ratio for all causes not specially calculated ..	...	.	4·25	6·85
	5·631	826	99·00	145·22

† Including Croup, Diphtheria, and Tonsillitis.

2. NATIVE ARMY, 1869.

The regimental strengths upon which the actual death-rate for the year is calculated are taken as at 1st April. The total at this date very closely approximates to the average for the year. The total deaths, absent and present, amount to 938, and this number with a strength of 45,952 represents a loss of 20·41 per 1,000. The deaths of men present with their regiments amounted to 693, giving a ratio of 17·29 per 1,000 in relation to a strength of 40,080, the average present during the year.

NATIVE TROOPS, 1869.

I.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in the BENGAL PRESIDENCY during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

(This Statement is for the Regular Native Army only, and for men present from month to month with their Regiments.)

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	43,700	1,694	3·88	60	...	1	3	9	5	1	4	2	...	2	10	1	6	1	1	3	1		1
February ...	43,071	1,525	3·54	53	...	9	7	8	8	1	1	1		1	7	2	2	..	..	1	1	1	3
March ...	42,575	1,563	3·67	48	...	1	1	8	3	1	5	4	2	1	12	...	1	1	1	2		4	1
April ...	39,470	1,379	3·49	35	..	13	2	2	3	1	...	.	1	..	5	...	3	1	.	..	1	..	3
May ...	37,788	1,327	3·51	47	...	15	3	2	3	6	3	1		3	5	..	1	..	1	1	.	3	.
June ...	37,388	1,307	3·50	45	...	11	1	5	2	9	2	3	2	1	2	..	1	..	..	2	3	1	..
July ...	38,013	1,338	3·52	35	...	5	...	5	6	1	3	4	1	..	2	1	2	...	..	...	...	3	2
August ...	38,118	1,673	4·39	52	...	24	...	7	3	...	2	4	...		4	1	4	...		..	...	1	2
September ...	38,118	2,162	5·67	121	...	95	...	2	3	1	6	3	...	.	2	1	1	.	2	...	...	4	1
October ...	38,730	3,214	8·30	61	...	16	...	14	3	...	8	2	.	1	3	.	3	...	2	2	1	3	3
November ...	41,756	3,212	7·70	67	...	2	...	20	6	...	13	8	...	..	7	.	..	1	2	1	...	6	1
December ...	42,222	2,229	5·28	69	...	4	...	17	3	1	13	7	2	1	11	1	..	...	2	2	...	4	1
						190	17	99	48	22	60	39	8	10	79	7	21	4	11	14	7	30	18
						Died per 1,000 of the Average Strength.																	
For the year ...	40,080	1,885	4·70	693	17·29	4·89	·42	3·66		·55	1·50	·97	·20	·25	1·97	·18	·60	·10	·27	·35	·18	·75	·45

Absent Deaths 245. Ratio of 938 deaths, 20·41 per 1,000 of the Total Regimental Strength.

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month. Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
Cholera ...	1	17	9	29	20	21	9	42	159	21	3	4	341	·85	57·48
Smallpox ...	23	28	30	13	8	3	...	...	.	.	1	...	106	·26	16·01
Fever, Intermittent ..	971	891	1,439	1,378	1,440	1,585	1,535	3,454	4,553	7,058	6,006	2,304	34,120	85·13	·29
„ Remittent and Continued ...	32	32	45	42	84	65	40	51	55	70	61	19	599	1·50	8·01
Apoplexy ...	1	1	3	...	8	35	2	...	2	...	1	...	53	·13	41·51
Dysentery ...	238	168	251	190	208	210	224	373	230	279	499	414	3,308	8·25	1·74
Diarrhœa ...	137	125	140	153	183	301	235	326	242	147	219	151	2,368	5·91	
Hepatitis ...	12	4	4	8	4	9	7	5	6	4	5	5	73	·18	10·96
Spleen Disease ...	21	13	16	27	32	27	15	36	35	49	86	50	407	1·02	2·46
Respiratory Diseases ...	174	145	100	86	80	76	63	67	59	72	165	205	1,382	3·45	5·72
Phthisis Pulmonalis ...	6	11	8	5	5	4	7	7	3	4	6	6	70	·18	31·29
Dropsy ...	2	2	3	4	...	...	1	1	4	...	2	1	20	·05	20·00
Scurvy ...	6	5	4	6	6	6	12	0	44	21	36	11	169	·42	6·51
Rheumatism ...	233	108	213	145	147	157	145	165	125	144	235	197	2.104	5·25	·35
Venereal Diseases ...	180	183	194	184	150	204	137	145	137	118	152	97	1,881	4·69	
Eye Diseases ...	45	40	68	86	117	89	108	164	65	80	72	53	997	2·49	
Abscess and Ulcer ...	349	244	300	211	256	470	428	418	319	231	335	278	3,847	9·57	
Wounds and Accidents ...	350	354	473	315	332	357	280	380	299	229	412	365	4,173	10·41	
All other Causes ...	338	319	457	395	355	393	314	305	306	235	347	302	4,156	10·37	
	3,119	2,780	3,856	3,286	3,447	4,018	3,562	6,029	6,072	9,362	9,572	4,461	60,164		
	Admitted per cent. of the Average Strength in each Month.														
	7·14	6·45	9·06	8·32	9·12	10·75	9·37	15·82	17·50	24·17	22·02	10·57	150·11		

NATIVE TROOPS, 1869.

II.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in BENGAL PROPER and in ASSAM during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS IN HOSPITAL. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	7,939	405	5·10	9	...	1	...	2	1	1	1	...	...	...	1	...	1	...	1	...	...	...	...
February ...	6,912	315	4·56	12	...	5	.	1	1	...	1	1	.	1	...	1	...	...	..	...	...	...	1
March ..	7,006	312	4·45	12	..	1	1	1	1	1	3	...	...	1	2	...	...	...	...	1	..	...	...
April .	7,589	355	4·68	15	..	9	...	1	.		...	...	...	..	2	...	.	1	...	...	...	...	2
May .	7,270	338	4·65	18		8		..	1	1	1	...	..	3	1	...	...	...	1	1	...	1	...
June ...	7,357	340	4·62	15		5	.	2	.	...	1	2	1	..	2	.	...	...	...	...	1	1	...
July .	7,408	375	5·03	9	..	...	...	2	1	.	1	1	1	...	1	...	..	...	...	...	...	1	1
August .	7,500	352	4·69	14	.	1		4	...	..	1	2	...	..	3	...	2	...	...	...	...	...	1
September ..	7,590	405	5·34	8	.	...	...	1		.	2	1	.	..	1	...	...	..	2	...	...	1	...
October	7,677	436	5·68	14	...	..	..	2	.	..	1	...	...	1	2	..	3	...	1	1	...	1	2
November ...	7,867	477	6·06	16	.			4	1	..	5	1	...	...	1	...	...	...	2	..	...	1	1
December ...	7,372	359	4·87	13	...	3	...	2	1	...	1	1	1	...	...	...	...	...	2	...	...	2	...
						33	1	22	7	3	18	9	3	6	16	1	6	1	9	3	1	8	8
						Died per 1,000 of the Average Strength.																	
For the year	7,462	372	4·98	155	20·77	4·43	·13	3·89		·40	2·42	1·21	·40	·80	2·15	·13	·80	·13	1·21	·40	·13	1·07	1·07

Absent Deaths 71. Ratio of 226 deaths, 26·38 per 1,000 of the Total Regimental Strength.

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH. Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
Cholera	1	6	3	22	15	11	1	3	...	1	1	2	66	·88	50·00
Smallpox	...	..	7	3	1	...	...	...	...	...	1	.	12	·16	8·33
Fever, Intermittent ...	209	213	250	300	307	340	353	392	415	490	789	315	4,412	59·13	·62
„ Remittent and Continued .	8	9	9	10	4	15	12	12	9	5	11	1	105	1·41	
Apoplexy	1	...	1	...	1	.	..	...	...	..	..	..	3	·04	100·00
Dysentery	115	95	120	87	100	111	108	80	63	75	111	71	1,136	15·22	1·48
Diarrhœa	67	67	53	51	61	103	74	60	40	39	68	29	708	9·49	
Hepatitis ..	1	..	..	3	3	6	3	1	1	3	2	1	24	·32	12·50
Spleen Disease ..	8	5	7	5	23	17	4	14	22	21	15	6	147	1·97	4·08
Respiratory Diseases ...	51	22	33	24	17	13	26	21	24	32	42	35	342	4·58	4·68
Phthisis Pulmonalis .	...	2		1	1	...	3	3	1	2	1	..	14	·19	42·86
Dropsy	1	1	...	1		...	..	..	2	..	...	1	6	·08	16·66
Scurvy	1	4	2	5	3	3	12	8	11	14	10	7	80	1·07	11·25
Rheumatism... ...	53	36	44	39	34	39	46	42	47	46	59	33	518	6·94	·37
Venereal Diseases ..	27	21	24	30	31	30	33	23	18	15	23	9	284	3·81	
Eye Diseases ..	9	11	14	8	7	6	12	1	6	21	18	10	123	1·65	
Abscess and Ulcer ...	61	20	46	43	49	64	37	56	42	37	58	23	535	7·17	
Wounds and Accidents ..	58	68	75	61	62	85	67	81	80	49	101	86	876	11·74	
All other Causes ...	90	80	141	100	126	102	100	100	81	85	87	74	1,184	15·87	
	731	669	829	813	818	935	891	909	892	935	1,400	703	10,575		
	Admitted per cent. of the Average Strength in each Month.														
	9·46	9·68	11·83	10·71	11·07	12·71	11·93	12·12	11·75	12·18	17·79	9·54	141·72		

NATIVE TROOPS, 1869.

III.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in the DINAPORE, BENARES, OUDE, and CAWNPORE DISTRICTS during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	7,028	223	3·17	5	...	...	...	...	...	...	...	1	...	1	1	.	1	...	...	...	...	.	1
February ...	8,135	258	3·17	6	...	1	1	...	...	...	...	...	...	...	4	...	...	...	...	...	.	...	.
March ...	7,903	275	3·48	7	...	...	...	...	...	...	...	1	2	.	2	...	...	...	...	...	.	1	1
April ...	7,385	214	2·90	8	...	2	1	1	...	...	...	...	1	...	1	...	1	...	...	...	...	...	1
May ..	7,082	206	2·91	4	...	3	...	...	.	.	...	.	...	...	...	...	.	.	...	...	...	1	...
June ..	7,054	202	2·86	9	.	2	1	1	...	2	1	...	...	1	...	.	.	...	...	...	1	.	.
July ...	7,001	217	3·10	4	..	2	..	...	...	...	...	...	...	.	...	...	1	.	...	.	...	1	.
August .	7,040	252	3·58	14	...	9	...	...	1	...	...	1	...	...	...	1	2	.	...	.	.	...	...
September ...	7,010	256	3·65	2	..	...	..	...	...	1	.	...	...	...	...	...	.	...	...	...	.	1	...
October ..	6,868	279	4·06	3	..	...	..	2	...	...	...	...	..	.	..	.	.	...	...	.	1	.	.
November .	7,249	296	4·08	3	...	...	.	2	...	.	1	...	...	.	...	...	...	.	...	.	...	...	...
December ...	6,320	227	3·59	4	...	...	...	1	...	...	1	.	...	...	...	...	...	...	...	...	.	1	1
						19	3	7	1	3	3	3	3	2	8	1	5	...	..	.	2	5	4
						Died per 1,000 of the Average Strength.																	
For the year ...	7,180	242	3·37	69	9·61	2·65	·42	1·11		·42	·42	·42	·42	·28	1·11	·14	·69	..	...	...	·28	·69	·56

Absent Deaths 39. Ratio of 108 deaths, 13·38 per 1,000 of the Total Regimental Strength.

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month. Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
Cholera ..	..	6	5	5	6	3	4	13	..	...	..	..	42	·59	45·24
Smallpox ...	.	4	14	4	...	1	...	...	...	.	..	..	23	·32	13·05
Fever, Intermittent ...	126	136	341	144	137	137	177	301	254	459	508	113	2,833	39·46	·27
„ Remittent and Continued ...	4	4	14	8	1	10	3	9	4	13	10	...	80	1·11	
Apoplexy ...	...	...	...	...	...	2	..	...	1	...	...	..	3	·04	100·00
Dysentery ..	9	14	32	20	9	12	32	69	28	25	72	39	361	5·03	·96
Diarrhœa ..	13	20	18	25	14	26	27	57	11	12	22	19	264	3·68	
Hepatitis .	..	...	...	1	...	...	1	1	2	1	2	..	8	·11	37·50
Spleen Disease ...	...	.	1	2	3	1	...	1	...	4	7	4	23	·32	8·70
Respiratory Diseases ...	17	25	40	18	14	7	13	16	11	14	29	13	217	3·02	3·69
Phthisis Pulmonalis .	2	2	4	1	2	1	1	2	..	1	1	1	18	·25	27·78
Dropsy ...	...	...	...	1	...	..	..	...	.	.	...	.	1	·01	.
Scurvy ..		...	...	..	...	1	...	...	.	.	4	1	6	·08	...
Rheumatism ...	41	40	39	27	30	20	19	24	22	29	41	25	357	4·97	·29
Venereal Diseases ...	29	39	32	38	36	70	22	35	37	23	32	21	414	5·77	
Eye Diseases ..	7	9	16	20	23	16	21	27	12	13	9	5	178	2·48	
Abscess and Ulcer ...	44	48	47	48	57	131	119	95	74	58	60	40	821	11·43	
Wounds and Accidents ..	36	54	93	64	64	55	36	72	45	49	71	43	682	9·50	
All other Causes ...	45	62	75	57	50	56	39	63	58	28	84	57	674	9·39	
	373	463	771	483	446	549	514	785	559	729	952	381	7,005		
	Admitted per cent. of the Average Strength in each Month.														
	5·31	5·69	9·76	6·54	6·30	7·78	7·25	11·15	7·97	10·62	13·13	6·03	97·56		

NATIVE TROOPS, 1869.

IV.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in the MEERUT DISTRICT and in ROHILCUND during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																	
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	5,755	174	3·02	10	...	...	1	3	4	...	...	1	...	...	3	...	2	1	...	1	...	...	...
February ...	5,771	150	2·60	8	...	...	...	2	4	1	...	...	...	...	...	...	...	...	...	...	...	...	1
March ...	5,898	182	3·09	10	...	...	...	...	...	...	...	2	...	...	3	...	1	1	...	1	...	2	...
April ...	5,605	177	3·16	2	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...
May	5,321	192	3·61	6	...	...	1	...	1	1	1	...	...	...	2	...	...	...	...	...	...	...	...
June	5,301	168	3·17	4	...	...	...	1	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...
July	5,407	171	3·16	6	...	...	...	2	1	1	...	...	...	...	...	...	1	...	...	...	...	...	1
August	5,410	185	3·42	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
September	5,478	207	3·78	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...
October	5,446	241	4·43	7	...	...	...	2	1	...	1	...	...	...	1	...	...	...	...	1	...	1	...
November	4,102	194	4·35	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
December ...	4,332	144	3·32	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
						...	2	10	13	4	2	3	...	...	12	...	6	2	...	3	...	4	2
						Died per 1,000 of the Average Strength.																	
For the year ...	5,340	182	3·40	63	11·78	...	·38	4·30		·74	·38	·56	...	...	2·24	...	1·12	·38	...	·56	...	·71	·38

Absent Deaths 37. Ratio of 100 deaths, 15·78 per 1,000 of the Total Regimental Strength.

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admitted during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	...	...	...	...	1	...	1	...	...	...	...	...	2	·04	...
Smallpox ...	7	3	1	2	1	2	...	...	...	...	...	...	16	·30	12·50
Fever, Intermittent	101	49	90	105	219	168	135	272	381	461	356	97	2,434	45·58	·90
„ Remittent and Continued	10	9	11	14	26	14	5	11	14	10	1	3	128	2·39	
Apoplexy ...	...	1	...	...	2	3	1	...	1	...	...	...	8	·15	50·00
Dysentery ...	13	9	18	19	14	22	11	22	21	17	19	15	200	3·74	1·35
Diarrhœa ...	7	4	22	22	15	23	12	16	15	9	15	10	170	3·18	
Hepatitis	1	1	1	2	...	1	2	1	1	...	1	1	12	·22	...
Spleen Disease	4	...	1	6	2	2	2	6	3	6	15	1	48	·90	...
Respiratory Diseases	24	47	39	9	23	11	4	9	6	10	11	4	200	3·74	6·00
Phthisis Pulmonalis	...	1	2	1	...	1	...	...	1	...	1	2	9	·17	66·66
Dropsy ...	...	1	1	1	...	...	1	...	...	...	1	...	5	·09	40·00
Scurvy ...	1	1	...	...	...	...	...	...	...	...	1	...	3	·06	...
Rheumatism ...	12	18	27	19	27	14	15	20	10	8	22	12	204	3·81	·36
Venereal Diseases	12	13	31	32	14	34	24	30	17	12	21	15	255	4·77	
Eye Diseases	6	4	11	17	18	16	14	30	12	7	7	5	147	2·75	
Abscess and Ulcer	37	22	38	29	26	34	51	52	30	31	44	24	418	7·81	
Wounds and Accidents ...	34	31	56	47	33	29	29	43	33	21	20	20	396	7·40	
All other Causes	41	51	63	55	65	58	39	48	36	45	25	18	534	9·98	
	313	265	412	380	476	433	346	560	581	640	560	227	5,193		
	Admitted per cent. of the Average Strength in each Month.														
	5·44	4·59	6·99	6·78	8·95	8·17	6·40	10·35	10·61	11·75	12·55	5·24	97·08		

NATIVE TROOPS, 1869.

V.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in the AGRA DISTRICT and in CENTRAL INDIA during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																	
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January	3,941	189	4·80	2	..	.	1	..	...	.	..	.	...	1	.					.	.	..	.
February .	3,751	171	4·56		..	.	..	..	..		.	..	..	.	.	.					.	.	..
March . ..	4,279	223	5·21	1	...	.	...	1	.	...						.	.				.	...	
April . .	3,687	233	6·32	2		1	1		..				.	.	.			.			.		.
May	3,525	196	5·56	15	..	4	2	1	1	4	..	1	.		2	.			..		.		.
June . .	3,483	189	5·43	11	...	4	...	.	..	6		.	...		..		..			1			.
July ..	3,554	158	4·45	10	..	3	..	..	2		2	3		.		.		.					..
August	3,577	184	5·14	17	..	14	.	1				1		..	1						.		..
September ..	3,627	260	7·17	1	...		...	...	...	.	.	1	.	.	.		.	.	.	.	.	.	
October	3,667	444	12·11	3	..	.		...	1		.	..		..				.	1				1
November .. .	4,110	444	10·80	8	.	1		1	2	..	.	1	...	.	1	.		1	.	1			..
December	3,490	225	6·43	1	...	.	...	1	..	...	..	...	..	.	..		.		.	.	..	..	
						27	4	5	6	10	2	7	..	1	4	.		1	1	2	..		1
						Died per 1,000 of the Average Strength.																	
For the year ...	3,725*	243	6·52	71	19·06	7·25	1·07	2·95		2·68	·54	1·88	..	·27	1·07	.	..	·27	·27	·54	..	..	·27

Absent Deaths 35. Ratio of 106 deaths, 21·20 per 1,000 of the Total Regimental Strength.

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admitted during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	...	..	...	1	4	7	3	23	.	...	1	...	39	1·05	69·23
Smallpox ...	5	3	5	4	6	..	.		.		.		23	·62	17·39
Fever, Intermittent	146	88	380	500	415	227	132	246	616	1,338	1,253	293	5,633	151·22	·19
„ Remittent and Continued ...	3	3	5	5	7	3	7	6	7	14	3	1	64	1·72	
Apoplexy ..	..	...	..	..	4	30	1	.	..	..	.	...	35	·94	28·57
Dysentery	8	5	31	32	34	21	28	106	20	30	43	19	380	10·20	1·06
Diarrhœa	14	5	28	32	31	90	64	116	36	22	25	6	469	12·59	
Hepatitis .	2	1	2	.	1	1		1	1		...	..	9	·24	..
Spleen Disease ..	3	1	2	6	1	2	1	1	1	1	10		29	·78	3·45
Respiratory Diseases	12	9	8	5	9	11	5	5	6	7	23	14	114	3·06	3·51
Phthisis Pulmonalis	..	...	..	1	...	.	.	..	1	1	...	..	3	·08	..
Dropsy	.	..	1	..	...		...		1	.		...	2	·05	50·00
Scurvy	...	..	.	..	1		..	1	33	7	12	1	55	1·48	1·82
Rheumatism ...	34	30	25	18	16	27	22	26	8	22	35	25	288	7·73	·08
Venereal Diseases .	37	44	50	31	25	24	20	19	30	35	29	21	365	9·80	
Eye Diseases	4	4	7	7	11	8	8	16	15	12	10	10	112	3·01	
Abscess and Ulcer ...	39	29	56	34	41	131	97	58	67	31	56	39	678	18·20	
Wounds and Accidents..	76	66	106	40	38	36	33	62	54	40	116	70	743	19·94	
All other Causes ..	40	28	52	46	25	53	24	40	30	15	33	20	406	10·90	
	423	316	761	768	669	671	445	725	926	1,575	1,649	519	9,447		
	Admitted per cent. of the Average Strength in each Month.														
	10·73	8·42	17·78	20·83	18·98	19·27	12·52	20·27	25·53	42·95	40·12	14·83	253·61		

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* Several of the Stations of this group were occupied by Regiments of the Madras Army in 1869; the statistics of the Madras Troops serving in the Bengal Presidency during 1869 are shown in Table XV.

NATIVE TROOPS, 1869.

VI.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in he PUNJAB during the Year 1869, *and the prevalence of the principal Diseases in each Month of the Year.*

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	15,846	563	3·55	22	...	...	1	4	...	...	3	...	..	..	8	1	2	...	...	2	1	...	...
February ...	17,323	590	3·41	24	...	1	6	4	3	...	...	...	...		3	1	2	...	..	1	1	1	1
March ..	17,010	542	3·19	16	...	..	...	5	2		2	1	...	..	4	...	..	.	1	..	...	1	...
April .	16,213	426	2·63	7	.	...	..	...	3	1	...	...	...	...	1	...	1	..	..	...	1	..	..
May ...	14,435	388	2·69	4	...	...	...	1	..	.	1	...	...	..	..	...	1	..	.	.	..	1	...
June .	14,087	406	2·88	6	...	...	...	1	...	...	...	1	1	...	...	...	1	..	.	1	1	...	...
July	14,387	414	2·88	6	..	..	...	1	2	...	...	..	.		1	1	...	...	...	...	..	1	...
August ..	14,590	700	4·80	6	..	..	...	2	2		1	...	...	...	..	..	..	..	.	..	.	...	1
September ..	14,413	1,034	7·17	109	...	95	...	1	3	...	4	1	...	...	1	1	..	..	..	...	..	2	1
October .	14,638	1,806	12·34	34	...	16	...	8	1	...	6	2	.		..	...	...	...	...	...	...	1	.
November ...	16,445	1,750	10·64	39	...	1	..	13	3	..	7	1	...	...	4	.	...	.	...	...	..	5	...
December ...	16,570	1,062	6·41	45	...	...	...	13	1	...	10	5	1	1	10	1	...	...	...	2	...	1	...
						113	7	53	20	1	34	16	2	1	32	5	7	..	1	6	4	13	3
						Died per 1,000 of the Average Strength.																	
For the year ...	15,413	805	5·22	318	20·63	7·33	·45	4·73		·07	2·21	1·04	·13	·07	2·08	·32	·45	...	·07	·39	·26	·84	·19

Absent Deaths 80. Ratio of 398 deaths, 22·14 per 1,000 of the Total Regimental Strength.

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month. Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
Cholera ..	...	2	...	1	..	. .	..	3	159	20	1	. .	186	1·21	60·75
Smallpox ...	6	12	3	...	...	.	. .	...		...		.	21	·14	33·33
Fever, Intermittent	288	333	351	320	362	715	735	2,244	2,867	4,895	3,930	1,242	18,281	118·61	·40
„ Remittent and Continued ..	5	7	6	5	45	23	13	16	21	28	34	11	214	1·39	
Apoplexy .	.	...	2	...	1	..	...	...	..	.	1	..	4	·03	25·00
Dysentery ...	70	42	31	41	51	49	45	96	107	130	237	124	1,023	6·64	2·89
Diarrhœa ...	38	27	25	20	57	58	57	77	140	64	86	56	705	4·57	
Hepatitis ..	7	2	1	2	...	1	1	1	1	. .	..	1	17	·11	11·77
Spleen Disease .	5	7	5	8	3	5	8	14	9	16	39	36	155	1·00	·65
Respiratory Diseases .	61	40	69	31	17	30	15	13	12	9	49	123	469	3·04	6·82
Phthisis Pulmonalis .	3	6	2	1	2	2	3	2	...	...	2	2	25	·16	28·00
Dropsy ..	1	...	1	1	...	...	...	1	1	...	1	...	6	·04	...
Scurvy ..	2	..	2	1	2	1	..	...	.	3	8	1	20	·13	5·00
Rheumatism ..	84	66	77	42	40	57	41	53	38	39	72	72	681	4·42	·51
Venereal Diseases .	60	66	57	53	40	46	38	38	35	28	32	18	511	3·31	
Eye Diseases ..	17	11	20	34	58	42	53	80	40	26	25	19	425	2·76	
Abscess and Ulcer ..	123	92	102	57	81	119	124	155	108	73	107	116	1,255	8·14	
Wounds and Accidents	103	102	107	97	135	151	113	122	87	64	116	102	1,299	8·43	
All other Causes ..	104	93	125	128	97	123	109	135	101	61	116	94	1,286	8·34	
	977	908	986	842	991	1,422	1,355	3,050	3,714	5,456	4,865	2,017	26,583		
	Admitted per cent. of the Average Strength in each Month.														
	6·17	5·24	5·79	5·53	6·87	10·09	9·42	20·90	25·77	37·28	29·58	12·17	172·47		

NATIVE TROOPS. 1869.

VII.

COMPARATIVE STATEMENT of the RATIOS of SICKNESS and MORTALITY among the NATIVE TROOPS serving in the various PROVINCES of the BENGAL PRESIDENCY, for the Year 1869.

(This Statement is for the men of the Regular Army only, and for the Strength represented in Tables I to VI.)

DISEASES.	BENGAL PROPER AND ASSAM.			DINAPORE, BENARES, OUDE, AND CAWNPORE DISTRICTS.			MEERUT AND ROHILCUND.			AGRA AND CENTRAL INDIA.			PUNJAB.			BENGAL PRESIDENCY.		
	Average Strength ... 7,462 Daily Sick per cent. of Strength ... ... 4·98 Admitted per cent. of Strength ... ... 141·72 Died per 1,000 of Strength— A. Cholera ... [illegible] B. All Causes ... [illegible] C. Excluding Absent Deaths ... [illegible]			Average Strength ... 7,180 Daily Sick per cent. of Strength ... ... 3·37 Admitted per cent. of Strength ... ... 97·56 Died per 1,000 of Strength— A. Cholera ... [illegible] B. All Causes ... [illegible] C. Excluding Absent Deaths ... [illegible]			Average Strength .. 5,340 Daily Sick per cent. of Strength . . 3·40 Admitted per cent. of Strength . ... 97·08 Died per 1,000 of Strength— A. Cholera ... [illegible] B. All Causes ... [illegible] C. Excluding Absent Deaths ... [illegible]			Average Strength ... 3,725* Daily Sick per cent. of Strength ... ... 6·52 Admitted per cent. of Strength ... ... 253·61 Died per 1,000 of Strength— A. Cholera ... [illegible] B. All Causes ... [illegible] C. Excluding Absent Deaths ... [illegible]			Average Strength ... 15,413 Daily Sick per cent. of Strength ... ... 5·22 Admitted per cent. of Strength ... ... 172·47 Died per 1,000 of Strength— A. Cholera ... [illegible] B. All Causes ... [illegible] C. Excluding Absent Deaths ... [illegible]			Average Strength ... 40,090 Daily Sick per cent. of Strength ... ... 4·70 Admitted per cent. of Strength ... . 150·11 Died per 1,000 of Strength— A. Cholera ... [illegible] B. All Causes ... [illegible] C. Excluding Absent Deaths ... [illegible]		
	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Died per 1,000 of Average Strength.
Cholera ...	·88	50·00	[illegible]	·59	45·24	[illegible]	·04	..		1·05	69·23	[illegible]	1·21	69·75	[illegible]	·85	67·48	[illegible]
Smallpox ...	·16	8·33	[illegible]	·32	13·05	[illegible]	·30	12·50	[illegible]	·62	17·39	[illegible]	·14	33·33	[illegible]	·26	16·04	[illegible]
Fever, Intermittent ..	59·13	·62	[illegible]	39·46	·27	[illegible]	45·58	·90	[illegible]	151·22	·19	[illegible]	115·61	·40	[illegible]	55·13	·29	[illegible]
" Remittent and Continued ...	1·41			1·11			2·39			1·72			1·39			1·50	8·01	
Apoplexy ..	·04	100·00	[illegible]	·04	100·00	[illegible]	·15	50·00	[illegible]	·94	28·57	[illegible]	·03	25·00	[illegible]	·13	41·51	[illegible]
Dysentery ..	15·22	1·46	[illegible]	5·03	·96	[illegible]	3·74	1·35		10·20	1·06	[illegible]	6·64	2·89	[illegible]	8·25	1·74	[illegible]
Diarrhœa ...	9·49		[illegible]	3·68		[illegible]	3·18		[illegible]	12·59		[illegible]	4·57		[illegible]	5·91		[illegible]
Hepatitis .	·32	12·50	[illegible]	·11	37·50	[illegible]	·22	.		·21	..		·11	11·77	[illegible]	·18	10·96	[illegible]
Spleen Disease ..	1·97	4·08	[illegible]	·32	8·70	[illegible]	·90	.		·79	3·45	[illegible]	1·00	·65	[illegible]	1·02	2·16	[illegible]
Respiratory Diseases ..	4·59	4·68	[illegible]	3·02	3·69	[illegible]	3·74	8·00	[illegible]	3·06	3·51	[illegible]	3·04	6·82	[illegible]	3·45	5·72	[illegible]
Phthisis Pulmonalis	·19	42·86	[illegible]	·25	27·78	[illegible]	·17	66·66	[illegible]	·08	..		·16	28·00	[illegible]	·18	34·29	[illegible]
Dropsy ..	·08	16·66	[illegible]	·01	..		·09	40·00	[illegible]	·05	50·00	[illegible]	·04	...		·05	20·00	[illegible]
Scurvy .	1·07	11·25	[illegible]	·08	...		·06			1·48	1·82	[illegible]	·13	5·00	[illegible]	·42	6·51	[illegible]
Rheumatism ...	6·94	·37	[illegible]	4·97	·29		3·81	·36	[illegible]	7·73	[illegible]	[illegible]	4·12	·53	[illegible]	5·25	·47	[illegible]
Venereal Diseases ..	3·81			5·77			4·77			9·93			3·31			4·69		
Eye Diseases ..	1·65			2·48			2·75			5·01			2·76			2·49		
Abscess and Ulcer ..	7·17			11·43			7·81			18·29			8·14			9·57		
Wounds and Accidents	11·74			9·50			7·49			19·94			8·43			10·41		
All other Causes ..	15·87			9·39			9·08			10·90			8·34			10·37		
Died out of Hospital ..		..	[illegible]	...				..	[illegible]		...	[illegible]	...	...	[illegible]	..		[illegible]
	141·72	...	[illegible]	97·56		[illegible]	97·08	..	[illegible]	253·61	..	[illegible]	172·47	...	[illegible]	150·11	...	[illegible]

See note to Table V.

NATIVE TROOPS, 1869.

VIII.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS composing the CENTRAL INDIA IRREGULAR FORCE during the Year 1869, *and the prevalence of the principal Diseases in each Month of the Year.*

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																	Died out of Hospital.
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	
January ...	3,984	111	2·79	4		...	...	1	...	...	1	...	.	.	2	...	...	...	...	..	..	...	...
February	3,966	112	2·82	3	.	...	..	...	1	...	..	.	.	...	...	..	1	.	..	...	...	1	...
March ..	4,002	147	3·67	5	..	2	...	1	...	..	...	...	1	..	...	..	...	...	..	1	.	...	...
April .	3,938	151	3·83	5		3	..	...	1	...	.	.	..	.	1	...	...	...	.	.	...	...	...
May	3,998	135	3·38	7	...	5	.	...	...	.	1	...	...	...	..	...	..	..	...	...	.	1	...
June ..	3,910	152	3·89	15	..	15	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...
July .	4,047	148	3·66	13		9	...	.	2	..	.	...	...	...	...	...	...	...	...	...	...	2	...
August .	3,991	173	4·34	9	...	4	...	..	1	..	2	1	..	..	.	..	..	...	...	.	...	1	...
September ..	4,014	228	5·68	4	...	...	...	3	.	.	1	...	..	..	...	...	..	...	..	.	...	...	...
October	4,049	417	10·30	3	..	..		3	..	..	...	...	...	...	...	...	...	...	...	...	..	...	...
November .	4,051	379	9·35	5	..	...	..	1	.	1	1	..	...	...	...	...	...	...	..	..	...	2	..
December	4,170	198	4·75	5	...	...	...	2	...	...	...	...	...	..	1	..	..	...	...	...	...	2	...
						38	...	11	5	1	6	1	1	...	4	..	1	...	...	1	...	9	...
						Died per 1,000 of the Average Strength.																	
For the year ...	4,010	196	4·89	78	19·45	9·47	...	3·99		·25	1·50	·25	·25	...	1·00	...	·25	..	.	·25	.	2·24	...

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admitted during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	...	1	3	3	3	31	15	7	..	...	.	. .	63	1·57	60·32†
Smallpox	..	1	..	1	1	1	..				...	..	4	·10	..
Fever, Intermittent ...	75	102	128	128	97	86	78	176	393	939	766	223	3,191	79·58*	·35
„ Remittent and Continued ..	1	.	4	7	...	2	6	1	1	1	2	3	28	·70	17·86
Apoplexy	...	...	...	..	2	...	...	.	.	1	..	...	3	·08	33·33
Dysentery	11	4	16	16	16	10	38	81	38	23	22	17	292	7·28	2·06
Diarrhœa	3	4	6	9	26	75	39	90	58	18	19	12	359	8·95	·28
Hepatitis	4	1	2	1	.	1	...	.	...	1	1	1	12	·30	8·33
Spleen Disease .	...	1	.	...	...	..	...	1	.	2	...	3	7	·17	..
Respiratory Diseases ...	13	9	10	2	4	3	2	2	8	4	7	7	71	1·77	5·63
Phthisis Pulmonalis ..		1	..	...	1	1	..	1	...	...	1	...	5	·12	20·00
Dropsy	..		..	.	1	..	...	..	..	1	...	..	2	·05	...
Scurvy	1	.	1	..	...	1	.	.	1	..		..	4	·10	...
Rheumatism .	20	15	18	19	13	27	21	13	21	14	19	13	213	5·31	·49
Venereal Diseases ...	14	25	27	17	19	25	21	15	42	40	30	11	286	7·13	
Eye Diseases ..	10	13	28	22	15	15	10	23	42	20	10	5	213	5·31	
Abscess and Ulcer .	22	33	37	22	24	58	58	58	42	34	27	28	443	11·05	
Wounds and Accidents ..	39	38	45	32	38	36	22	37	27	37	32	29	412	10·27	
All other Causes	26	21	36	33	44	67	36	48	53	37	39	35	475	11·85	
	239	269	361	312	304	439	346	553	726	1,172	975	387	6,083		
	Admitted per cent. of the Average Strength in each Month.														
	6·00	6·78	9·02	7·92	7·60	11·23	8·55	13·86	18·09	28·95	24·05	9·28	151·70		

The Total Strength of the Corps of the Central India Force was approximately 4,920, and out of this strength the deaths were 89; this gives a ratio of 18·09 per 1,000. The Gain and Loss Statement for the year is as under—

Strength borne on the Rolls on 1st January 1869	4,928
Additions received during the year	373
Total ...	5,301
Deaths at Head-quarters 54, on Detachment 24, on Furlough 11, Invalided for Discharge 41, Otherwise discharged 254	384
Remaining on the Rolls of the Regiments on 31st December	4,917

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* In several regiments many cases of fever were treated out of Hospital; the ratio for intermittent fever should in reality be much higher than is here shown.

† In some instances where men died from cholera away from their regiments no admission is entered; this ratio, therefore, should be somewhat lower than is here shown.

NATIVE TROOPS, 1869.

IX.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS composing the PUNJAB IRREGULAR FORCE during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhoea.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anaemia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January	11,540	333	2·89	14	..	..	.	2	1	1	1	..	.		3	1	1				.	3	1
February	11,187	284	2·54	11	...	..	...	1	.	1	2	.			3			.				2	2
March	11,106	277	2·49	5	.	.		1	1	..	..	..	1		1			.			1	..	.
April	10,455	255	2·44	4		.	1	...	...	1	.	..			1						.	.	1
May	9,633	260	2·70	4	.	...	..	1			...		.		1		2	.			..	.	..
June	9,669	273	2·82	5	.	.		.	2			1		1	1						..	.	
July	9,496	299	3·15	3	..	.	...	...	...	..	...	1			..		1				1	.	
August	9,443	495	5·24	6	.	...	...	1	2	.	1	..	.	.	.			.	1	1	.		..
September	9,479	924	9·75	6	.		.	2	1	1	1		.		.	.				..	.	1	...
October	9,328	1,506	16·15	149		134		6	3	2	2				1						..	1	.
November	10,341	1,422	13·75	31		8		8	1	2	2	1	.	.	2		1	1	.	3	.	1	1
December	10,925	975	8·92	21	..	...	1	8	1	2	1	2	.	.	3				1	1	.	1	.
						142	2	30	12	10*	10	5	1	1	16	1	5	1	2	5	2	9	5
						Died per 1,000 of the Average Strength.																	
For the year	10,217	609	5·96	259	25·36	13·90	·20	4·11		·97	·97	·49	·10	·10	1·57	·10	·49	·10	·20	·49	·20	·88	·49

CAUSES OF ADMISSIONS.	Numbers of Admissions into Hospital in each Month. Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
Cholera		.	..	1	..		...		.	188	10		199	1·95	71·36
Smallpox	.		2	1		.	.	1			1	.	5	·05	40·00
Fever, Intermittent	231	159	216	186	200	377	346	1,651	2,059	3,929	3,453	1,205	15,011	146·92	·20
„ Remittent and Continued	1	5	4	3	3	7	1	7	13	27	15	8	94	·92	12·77
Apoplexy	1	1	.	1	2	.	1	1	1	2	2	3	15	·15	66·67
Dysentery	21	18	16	21	21	34	30	62	42	75	145	99	584	5·72	1·71
Diarrhoea	27	18	20	28	30	58	64	89	46	72	72	82	606	5·93	·83
Hepatitis	4	3	1	4	2	7	2	.	6	5	1	3	38	·37	2·63
Spleen Disease	10	6	2	3	3	2	2	6	4	7	14	28	87	·85	1·15
Respiratory Diseases	43	34	37	23	15	16	8	13	15	14	33	108	359	3·51	4·46
Phthisis Pulmonalis	2	1	2	..	4	1	.	1	2	1	2		16	·16	31·25
Dropsy	.	.						1	.	..	2	..	3	·03	33·33
Scurvy	1	2	3	2	3	3	3	.	7	4		2	30	·29	6·67
Rheumatism	55	45	57	37	34	37	31	41	32	17	17	70	503	4·92	·37
Venereal Diseases	18	16	22	15	17	16	7	20	15	13	21	11	191	1·87	
Eye Diseases	16	8	21	29	42	41	43	30	24	19	12	9	294	2·88	
Abscess and Ulcer	114	76	81	59	83	116	130	165	105	52	91	105	1,177	11·52	
Wounds and Accidents	131	121	116	115	124	165	90	132	75	38	72	80	1,268	12·41	
All other Causes	92	63	103	103	100	134	86	120	73	55	105	122	1,165	11·40	
	767	576	703	631	791	1,011	853	2,340	3,419	4,518	4,098	1,935	21,645		
	Admitted per cent. of the Average Strength in each Month.														
	6·65	5·15	6·33	6·04	8·21	10·46	8·98	24·78	36·07	48·45	39·63	17·71	211·85		

Calculated on a Strength of 12,350, which approximately represents the Total Strength, absent as well as present, the Death-rate of the year is 26·72 per 1,000, the equivalent of 330 deaths.

The Gain and Loss Statement for the Frontier Force for the year was as under:—

Strength borne on the Regimental Rolls on 1st January 1869	12,478
Additions received during the year	1,116
Total	13,594
Deaths at Head-quarters and in Detachments 259, died while on Furlough and Sick Leave 71, Invalided for Discharge 255, Transfers given 45, Discharged otherwise 744	1,374
Remaining on the Rolls at the close of 1869	12,220

* Chiefly convulsion and coma occurring during the course of intermittent fever, returned under the head of Apoplexy.

NATIVE TROOPS, 1869.

X.

STATEMENT showing the DAILY AVERAGE SICK-RATE of each STATION in each MONTH.

STATIONS.	Average Strength for the period of observation.	Daily Sick per cent. of Average Strength in each Month.												Average Daily Sick per cent. of Strength during the period of observation.	Ratio for each Province.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
Fort William	620	7·35	5·67	4·87	3·75	4·25	4·15	5·23	5·18	4·64	6·27	7·34	6·40	5·48	4·98
Alipore	776	8·58	9·96	8·43	7·34	5·95	4·32	4·34	4·42	4·81	5·35	8·27	5·50	6·44	
Dum-Dum	420	2·14	3·53	4·72	7·35	4·27	2·68	3·14	4·81	4·45	4·48	2·30	4·65	3·81	
Barrackpore	826	7·64	2·37	3·63	3·02	2·88	3·58	3·30	3·84	4·33	4·94	5·10	5·65	4·36	
Berhampore	147	10·00	6·13	6·13	6·46	3·00	4·55	5·84	5·23	11·41	11·80	11·28	8·27	6·80	
Dacca	331	2·71	4·90	4·34	4·65	5·45	5·08	4·85	4·90	4·09	5·18	4·50	2·75	4·53	
Cachar	319	3·58	6·17	6·18	4·28	3·35	3·45	3·74	4·72	5·35	6·38	6·20	4·20	4·70	
Shillong (10 Months)	818	4·64	...	...	7·22	6·58	7·21	8·51	6·46	5·23	5·16	4·84	4·76	6·11	
Gowhatty	531	6·31	5·33	3·46	3·51	3·17	3·80	5·15	4·76	9·33	8·65	9·40	5·37	5·65	
Tezpore	188	2·81	2·20	2·29	3·33	5·32	2·17	3·23	3·50	4·92	4·26	4·74	3·08	3·72	
Nowgong	86	3·37	5·62	3·37	4·49	6·90	5·95	4·71	2·35	3·57	3·57	8·57	2·38	4·65	
Debrooghur and Upper Assam	845	3·66	2·14	1·63	2·62	2·00	2·44	3·13	2·63	4·51	6·13	6·00	3·93	3·31	
Buxa	611	3·95	2·51	3·70	4·39	7·21	8·36	9·91	7·81	8·52	8·30	7·05	5·08	6·22	
Julpigoree (11 Months)	633	5·41	5·26	6·03	5·79	6·35	6·53	3·96	4·51	4·71	4·12	5·54	...	5·21	
Bhaugulpore	468	3·28	3·80	4·26	2·55	3·28	3·58	4·39	3·51	3·30	2·80	9·90	1·57	3·63	
Dinapore	532	1·82	2·20	3·28	3·28	3·66	7·16	5·28	5·42	6·06	5·87	4·19	3·63	4·51	3·37
Segowlie	306	2·57	2·25	2·78	3·10	2·79	2·51	2·14	3·50	3·83	4·35	5·61	2·37	3·27	
Benares	560	4·15	4·96	5·58	4·58	4·10	5·08	4·00	5·07	6·17	7·03	7·75	6·20	5·45	
Chunar	64	...	1·56	...	1·56	...	1·56	...		1·56	1·56	1·56	1·56	1·56	
Goruckpore	667	7·10	5·47	4·39	3·93	3·41	2·00	3·19	2·77	2·67	3·40	3·70	3·85	3·90	
Fyzabad	680	3·12	2·49	2·48	1·90	2·48	2·85	2·50	2·54	2·80	2·51	2·18	2·12	2·48	
Lucknow	1,707	2·22	2·53	3·11	2·18	2·43	1·54	1·98	3·00	2·36	1·51	1·93	1·95	2·26	
Seetapore (11 Months)	427	...	5·88	6·84	4·36	4·50	2·41	3·59	4·76	3·57	3·17	4·02	3·49	4·22	
Futtehghur	164	2·30	2·33	4·09	5·06	3·66	3·73	5·88	3·33	4·61	4·46	1·70	3·98	3·66	
Cawnpore	987	3·36	3·52	3·22	3·21	3·23	2·82	3·32	4·46	4·08	4·49	5·85	5·36	3·85	
Allahabad	901	2·10	1·88	2·24	1·47	1·54	1·98	2·39	2·43	2·51	1·84	4·13	2·93	2·44	
Nagode	146	2·84	2·88	3·07	4·32	4·32	3·60	5·04	5·88	11·11	21·57	13·26	7·74	7·53	
Shahjehanpore	337	3·68	2·37	2·89	4·81	3·72	2·26	1·91	1·92	2·57	2·41	1·80	1·80	2·67	3·40
Bareilly	939	2·22	2·08	2·30	2·76	2·42	2·24	2·88	3·29	3·39	2·95	3·17	2·71	2·66	
Moradabad	408	3·36	2·35	1·66	2·38	3·37	3·40	2·11	1·65	·95	1·10	1·91	1·37	2·21	
Almorah	665	2·74	2·45	2·02	3·62	2·64	3·13	4·50	3·82	3·47	2·48	2·83	2·70	3·16	
Chuckrata Road	408	4·24	3·28	3·29	4·79	8·00	4·91	5·72	4·87	3·80	4·90	4·11	2·60	4·66	
Deyrah	784	2·99	3·44	4·66	3·66	5·11	4·08	3·82	4·07	4·96	4·39	3·57	3·82	4·08	
Roorkee	237	4·31	3·89	3·70	2·42	2·04	2·35	2·02	6·67	10·03	13·93	6·89	1·24	5·91	
Meerut (10 Months)	970	1·65	1·87	2·17	2·02	1·73	2·24	1·92	1·72	1·61	2·55	..	..	1·96	
Allyghur	84	3·45	2·35	2·25	4·55	7·23	4·91	4·94	6·17	4·94	3·70	5·88	4·55	4·76	
Delhi	638	5·13	3·31	4·78	3·09	4·40	3·98	3·16	4·11	5·45	8·54	9·08	6·95	5·17	
Agra	950	8·88	7·59	7·93	8·91	5·74	5·68	6·15	4·06	4·74	5·33	5·07	5·06	6·11	6·52
Morar	1,410	4·50	4·12	4·31	6·45	6·22	6·07	3·27	5·93	7·12	10·45	10·40	10·20	6·52	
Seepree (10 Months)	245	2·64	1·71	2·02	3·36	3·11	2·83	2·80	3·69	7·80	11·89	...	..	4·08	
Nowgong	267	3·70	4·97	4·30	5·45	4·74	4·57	5·50	6·34	9·13	11·39	15·15	7·27	6·74	
Jhansi	619	4·26	4·08	4·61	4·00	5·69	5·10	4·10	4·24	8·54	20·53	15·49	2·90	6·95	
Lullutpore	77	2·74	2·67	4·00	5·33	2·67	2·67	4·00	5·33	9·46	13·51	12·33	3·70	5·19	
Deolee	107	4·62	5·88	4·52	3·12	4·38	5·45	5·23	8·82	12·71	24·61	17·97	7·74	10·15	
Umballa	913	5·43	5·46	4·40	3·14	3·53	2·86	3·17	3·53	3·73	5·67	4·81	3·40	4·05	5,22
Simla (7 Months)	142	...	..	...	1·39	2·78	3·52	2·11	2·11	4·93	3·52	..		2·82	
Loodianah	87	3·33	1·12	3·37	1·12	1·11	4·44	3·33	7·78	5·56	25·58	11·39	1·30	5·75	
Phillour (6 Months)	83	..	.	...		..	..	4·88	15·85	13·70	4·00	3·61	3·80	7·23	
Julluudur (11 Months)	476	4·40	5·22	4·34	4·44	2·88	3·01	3·49	5·63	11·55	12·41	12·58	..	5·88	
Ferozepore (10 Months)	594	2·37	1·83	1·07	·95	1·59	1·05	1·37	3·46	4·30	5·67	.	...	2·36	
Mooltan	946	4·40	3·36	3·04	2·68	1·20	1·75	2·18	4·27	5·30	11·26	13·53	9·05	4·86	
Sealkote (10 Months)	1,002	.	.	4·12	3·55	3·27	3·49	3·04	3·01	3·18	3·73	4·50	2·80	3·49	
Dhurmsalla	682	3·07	3·18	2·83	2·88	2·34	3·13	3·75	6·38	9·13	9·09	4·76	2·71	4·30	
Bukloh	670	2·36	2·11	2·51	2·19	2·52	2·24	3·15	3·59	7·45	7·00	4·05	3·38	3·58	
Umritsur	149	..	·66	1·32	1·32	1·32	·66	·66	1·32	1·07	8·11	3·47	2·22	2·01	
Meean Meer	1,269	4·55	4·21	6·88	5·00	4·38	3·75	2·38	5·33	5·86	20·71	25·06	12·62	8·75	
Jhelum	1,599	2·84	3·16	2·65	2·11	2·43	2·67	2·83	3·45	3·65	5·30	8·13	5·08	3·75	
Rawulpindee	1,138	3·11	3·00	2·72	2·80	2·93	3·15	2·78	4·00	6·92	20·00	15·52	6·98	5·01	
Tullagunge (11 Months)	587	..	·87	1·19	1·61	1·85	1·60	1·00	1·69	1·06	1·54	1·92	1·92	1·53	
Attock	171	3·45	3·45	2·87	1·85	1·74	2·33	2·33	4·07	10·47	16·28	10·77	8·88	6·43	
Murree (8 Months)	101	.	...	...	..	1·87	3·25	4·30	3·06	5·10	9·55	9·21	3·45	4·95	
Nowshera	1,042	4·34	3·90	3·98	2·39	2·03	2·00	2·37	4·34	6·58	12·20	10·63	11·62	5·37	
Peshawur	3,390	3·71	2·58	2·29	1·88	2·89	3·56	3·91	7·66	14·17	22·81	16·59	9·93	7·28	
PUNJAB FRONTIER FORCE.															
Murdan	867	3·90	4·18	3·83	4·44	4·35	5·46	5·24	4·43	6·39	13·15	20·82	17·83	7·96	5·96
Abbottabad	1,121	2·92	2·84	2·03	3·12	2·47	3·03	3·72	6·77	12·79	22·48	10·74	6·71	6·54	
Kohat	2,395	2·17	2·46	2·94	2·15	2·04	2·55	3·28	7·76	17·68	23·93	17·32	9·30	7·43	
Bunnoo	1,088	3·63	2·71	2·32	2·43	3·21	3·40	3·28	4·62	7·95	16·27	15·00	10·87	6·46	
Dera Ghazee Khan	1,591	2·41	1·83	1·63	1·83	2·67	1·69	2·29	3·63	5·97	11·72	7·11	5·08	3·83	
Dera Ismael Khan	1,057	2·53	2·03	1·96	1·73	2·59	2·13	2·03	2·82	3·43	6·08	9·92	6·31	3·62	
Rajanpore	405	5·65	4·00	3·29	4·81	3·29	3·50	2·98	5·33	8·53	11·60	21·91	14·14	7·41	
Bhawulpore	193	2·33	·77	·77	·77	1·70	1·70	2·84	6·82	9·66	15·43	16·54	11·11	4·66	
CENTRAL INDIA FORCE.															
Augur	228	4·91	6·76	7·37	6·82	6·74	6·31	4·94	4·60	3·40	4·21	6·32	2·89	5·26	4·89
Goonah	330	3·10	3·30	3·16	2·07	3·29	3·86	1·55	1·22	1·22	4·19	3·48	2·53	2·73	
Sirdarpore	360	2·36	1·86	2·38	3·03	3·43	2·84	3·69	4·11	4·37	3·54	1·97	1·83	2·89	
Kherwarrah	673	2·27	1·62	2·43	2·30	2·33	3·34	2·61	5·51	4·78	7·39	7·83	5·71	4·01	
Erinpoorah	869	3·23	4·14	6·09	5·83	4·57	2·97	3·20	3·66	5·83	10·34	14·30	4·71	6·20	
Deolee	717	3·17	2·66	3·68	3·59	3·62	7·32	6·52	6·75	12·38	19·87	17·69	7·55	7·05	
Sehore	812	1·80	1·75	2·13	3·54	1·96	2·03	2·73	3·23	3·34	4·39	5·87	4·02	3·08	

NATIVE TROOPS, 1869.

XI.

STATEMENT showing the ratio in which the CHIEF DISEASES have contributed to make up the ADMISSION-RATE of each STATION.

STATIONS.	Average Strength during the period of observation.	Admitted into Hospital per cent. of Average Strength.											Admitted per cent. of Strength during the period of observation.
		Cholera.	Fevers.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Ophthalmia.	Rheumatism.	Venereal Diseases.	Diseases of the Respiratory Organs.	All other Causes.	
Fort William	620	·65	50·81	17·26	13·08	·16	·97	·80	5·97	2·58	4·03	25·16	121·45
Alipore	776	·64	56·70	38·14	18·04	2·6	·77	2·07	7·99	3·87	9·41	42·91	182·60
Dum-Dum	420	·24	44·05	10·24	8·10	...	·95	·24	5·95	2·62	5·71	28·57	106·67
Barrackpore	826	·24	33·66	11·90	1·57	·12	1·70	·36	3·63	1·21	2·06	11·38	67·02
Berhampore	147		153·06	4·76	4·08	...		..	5·44	2·72	2·72	18·37	191·15
Dacca	331	3·93	50·76	9·67	7·25	·30	·30	1·81	9·36	5·44	5·44	40·55	143·81
Cachar	319	·31	62·07	8·78	1·25	...	·63	3·76	10·03	5·33	3·14	36·36	131·66
Shillong (10 Months)	818	1·22	42·30	17·30	13·81	1·96	11·25	·61	7·21	6·11	5·02	26·41	133·86
Gowhatty	531	·19	135·03	11·68	4·33	·19	1·32	2·15	3·58	2·07	4·14	35·40	200·38
Tezpore	188	·53	80·85	3·72	9·04	...	2·66	1·07	8·51	5·85	5·85	68·09	186·17
Nowgong	86	22·09	48·84	18·60	9·30	.	...		5·82	10·47	1·16	48·84	165·12
Dibroogurh and Upper Assam	845	·95	81·18	9·82	10·41	...	·95	2·84	6·51	·59	3·91	32·90	150·06
Buxa	611	..	40·75	15·88	11·95	·16	..	1·64	6·87	2·62	4·58	54·01	138·46
Julpigoree (11 Months)	633	·16	59·71	10·90	10·27	.	...	1·58	8·85	3·79	2·69	46·44	144·39
Bhaugulpore	468	..	29·49	10·26	2·56	·21	·43	1·92	8·76	11·11	2·78	47·86	115·38
Dinapore	532	2·82	26·88	4·32	3·20	..	·38	2·26	6·20	19·36	1·50	15·60	82·52
Segowlie	306	...	44·77	10·78	2·29	·65	·65	1·96	4·25	5·23	3·27	26·80	100·65
Benares	569	·35	42·18	5·62	3·87	..	1·76	1·23	4·75	8·08	3·52	37·96	109·32
Chunar	64	1·56	48·44	6·25		...		1·56	1·56	6·25	1·56	14·07	81·25
Goruckpore	667	..	35·83	3·15	1·65	·30	·75	4·20	6·89	4·20	3·75	46·93	107·65
Fyzabad	686		42·57	6·71	1·16		·14	2·04	2·19	2·77	2·19	14·72	74·49
Lucknow	1,767	·17	30·16	2·80	1·36	·06	..	2·89	4·70	3·45	1·24	28·75	84·07
Seetapore (11 Months)	427	·70	28·10	4·45	6·79		.	2·81	12·65	4·02	4·45	48·01	112·88
Futtehghur	164	·61	29·27	3·66	7·93	...	1·22	1·22	7·31	5·49	7·93	56·09	120·73
Cawnpore	987	·20	40·53	1·22	10·64	·30	·10	3·04	3·45	6·48	7·09	37·69	110·74
Allahabad	901	1·66	43·62	11·51	2·77		.	1·44	3·00	3·66	1·33	21·31	93·38
Nagode	146	...	121·92	6·85	2·05		..	1·37	8·22	6·85	1·37	19·18	167·81
Shahjehanpore	337	·30	29·67	5·34	..	·59	...	·30	1·78	5·05	·89	11·57	55·49
Bareilly	939	...	13·10	2·98	·64	.	·32	2·77	1·81	7·14	·85	20·34	49·95
Moradabad	408	·25	31·13	3·19	2·45	·25	·25	1·47	2·20	3·67		12·74	57·60
Almorah	665	...	35·34	2·86	2·11	...	·15	3·01	8·57	4·35	4·06	20·00	80·45
Chuckrata Road	408	..	57·60	5·88	8·58		·25	1·22	8·09	3·92	8·09	44·61	138·24
Deyrah	784		37·63	1·79	4·85	1·15	2·93	7·78	4·59	6·12	4·08	33·67	104·59
Roorkee	237	..	167·93	·84	2·95	...	..	1·27	1·27	2·53	2·11	17·72	196·62
Meerut (10 Months)	970	...	23·71	4·02	1·34	.	·10	2·06	2·17	4·53	7·22	16·29	61·44
Allyghur	84	...	76·19	5·95	16·67	...		1·19	4·76	5·95	3·57	30·95	145·23
Delhi	638	...	118·97	5·96	5·17	...	2·82	·78	2·35	1·56	2·98	17·34	157·93
Agra	950	1·47	112·42	9·47	21·26	·11	·53	4·95	9·79	7·17	3·79	58·11	229·07
Morar	1,410	1·63	156·60	10·00	13·33	...	1·13	2·55	7·31	8·72	2·91	46·88	251·06
Seepree (10 Months)	245	·41	97·55	4·90	6·94	.	·41	2·86	5·30	3·26	2·45	27·76	151·84
Nowgong	267	...	155·81	10·49	3·74	1·50	1·50	2·25	8·24	11·23	4·49	80·90	280·15
Jhansi	619	·16	105·15	9·37	5·01	·32	·49	1·78	5·81	15·67	1·78	38·29	183·83
Lallutpore	77	...	223·38	14·29	...	1·30	..	1·30	2·60	18·18	3·89	54·54	319·48
Deolee	197	.	195·94	20·30	10·66	·51	..	2·03	9·64	11·17	2·54	85·79	338·58
Umballa	913	·11	45·24	4·60	1·31	·11	·66	3·83	5·91	4·60	2·52	21·36	90·25
Simla (7 Months)	142	...	53·52	2·11	7·04	...	.	1·41	2·82	2·82	·70	18·31	88·73
Loodianah	87		214·94	13·79	2·30	.		2·30	5·75	5·75	...	18·39	263·22
Phillour (6 Months)	83	1·20	159·04	3·61	..	...	1·20		..	2·41	3·62	9·64	180·72
Jullundur (11 Months)	470	·21	108·82	7·77	1·47	...	1·05	1·26	5·67	6·52	2·94	38·24	173·95
Ferozepore (10 Months)	591	·17	59·93	3·70	2·53		.	2·86	1·72	·67	2·86	16·33	90·57
Mooltan	946	...	100·53	1·59	·53	...	·10	2·64	2·33	·85	2·43	19·13	130·13
Sealkote (10 Months)	1,002	.	43·01	1·10	1·60	.	·20	1·80	2·89	4·79	1·10	25·15	81·64
Dhurmsalla	582	...	106·87	1·72	2·92	·17	·86	3·95	5·33	4·12	1·20	21·31	148·45
Bukloh	670	.	45·82	2·54	1·49	..	2·83	5·07	4·48	·90	·45	28·66	92·24
Umritsur	149	.	91·28	6·71	8·72	.	·67	1·34	1·34	·67	3·36	6·71	120·80
Meean Meer	1,269	.	201·65	9·30	3·55	·16	·24	4·10	4·96	3·63	1·65	26·79	256·03
Jhelum	1,599	.	94·75	6·32	2·31	·06	·13	3·13	3·19	3·50	3·19	27·82	144·40
Rawulpindee	1,138	..	97·71	3·16	4·13	·18	·18	2·90	5·18	5·01	4·74	26·63	149·82
Tullagunge* (11 Months)	587		18·91	1·36	·34	..	·17	2·39	·85	3·75	1·02	8·69	37·48
Attock	171	.	239·77	13·45	3·51	.	·58	4·09	2·34	4·68	·58	30·41	299·41
Murree (8 Months)	101	...	58·42	6·93	6·93	.	.		4·95	11·88	·99	26·73	116·83
Nowshera	1,042	..	132·72	10·08	2·97	·10	·38	1·92	4·61	2·88	2·21	22·26	180·13
Peshawur	3,380	5·35	193·19	11·54	11·69	·21	2·84	2·40	5·71	1·63	5·09	28·84	267·99
Punjab Frontier Force.													
Murdan	867	·35	78·55	2·08	1·04	1·96	1·04	7·15	4·96	4·26	5·65	47·29	157·33
Abbottabad	1,421	...	175·16	2·89	4·71	·07	·28	4·36	6·05	2·11	3·17	31·67	230·47
Kohat	2,395	7·93	171·60	7·43	11·73	·29	1·25	1·92	5·23	1·25	3·59	32·99	245·30
Bunnoo	1,688	·36	204·62	11·79	8·53	·23	1·13	2·25	7·23	1·36	6·22	44·49	288·21
Dera Ghazee Khan	1,591	...	104·97	2·33	1·76	·06	·25	3·14	3·83	2·33	2·01	31·87	153·55
Dera Ismael Khan	1,657	..	111·47	4·04	2·59	·42	1·09	1·87	2·90	1·87	2·11	28·85	157·21
Rajanpore	405	...	138·27	8·40	1·48	·25	·49	·74	3·46	·49	·74	54·57	208·89
Bhawulpore	193	..	151·30	5·18	1·04	...	·52	1·04	2·07	·52	2·07	37·30	201·04
Central India Force.													
Augur	228	1·75	60·09	10·97	1·32	2·19	·44	4·39	4·82	3·07	2·63	30·84	128·51
Goonah	330	1·52	31·21	3·03	1·21	·30	·30	·30	2·12	1·82	.	7·58	49·39
Sirdarpore	380	2·63	69·26	2·11	5·26	..	.	11·05	3·68	·53	2·11	20·74	117·37
Kherwarrah	673	2·08	73·25	5·94	5·35	·45	·30	4·61	7·13	·89	1·78	52·45	154·23
Erinpoorah	809	·58	56·16	8·45	5·18	·12	·12	6·06	4·14	17·26	1·61	35·21	128·89
Deolee	717	2·79	145·19	9·62	20·85	...	·28	6·83	9·62	13·67	1·82	46·30	265·97
Sehore	812	·62	89·65	13·55	4·56	·25	.	4·43	3·15	2·09	2·22	16·62	137·44

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* First occupied in February 1869.

NATIVE TROOPS, 1869.

XII.

TABLE showing the MORTALITY in each STATION, the CAUSES of DEATHS, and the ratio of DEATHS to STRENGTH.

STATIONS	Average Strength for the period of observation.	Causes of Deaths in Regimental Hospitals.																		Total Deaths		Died per 1,000 of Average Strength.			
		Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.	A. Of men present with their Regiments.	B. Of men absent from their Regiments.	A. With their Regiments. a. Cholera.	A. With their Regiments. b. All other Causes.	A. With their Regiments. c. All Causes.	B. All Deaths absent and present.
Troops on the march in Bengal and the N. W. Provinces	...	4	...	2	1	1	1	1	...	...	7	...	...	...	...	...	...	...	...	17	...	...	...	...	...
Fort William	620	3	...	...	1	...	1	2	...	1	1	1	...	...	1	...	...	...	1	12	...	4·84	14·52	19·36	...
Alipore	707	2	...	...	1	...	2	2	...	1	4	...	...	...	1	...	...	...	1	14	...	2·51	15·07	17·58	...
Dum-Dum	420	1	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	1	...	4	...	2·38	7·14	9·52	...
Barrackpore	820	1	...	8	2	...	1	...	...	2	1	...	...	...	1	2	...	1	...	19	...	1·21	21·79	23·00	...
Berhampore	147	...	...	2	...	1	...	...	...	...	...	...	...	...	...	...	1	1	...	5	...	...	34·01	34·01	...
Dacca	331	7	...	...	...	...	2	...	...	1	1	...	...	1	...	...	...	...	...	12	...	21·15	15·10	36·25	...
Cachar	319	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	2	...	3·13	3·13	6·27	...
Shillong (10 Months)	818	3	...	1	1	...	3	2	2	...	1	...	2	...	...	1	...	2	2	20	...	3·67	20·78	24·45	...
Gowhatty	531	1	1	3	1	...	2	...	1	...	3	...	1	...	...	...	...	...	...	13	...	1·88	22·60	24·48	...
Tezpore	188	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	5·32	5·32	...
Nowgong	86	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8	...	93·02	...	93·02	...
Debrooghur and Upper Assam	845	5	...	...	...	1	3	...	...	...	1	...	1	...	...	...	...	2	1	14	...	5·92	10·65	16·57	...
Buxa	611	...	...	4	1	...	2	2	...	...	4	...	1	...	6	...	...	...	3	23	...	...	37·64	37·64	...
Julpigoree (11 Months)	633	1	...	2	...	...	1	1	...	...	...	...	...	...	...	...	...	1	...	6	...	1·58	7·90	9·48	...
Bhaugulpore	468	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	4·27	4·27	...
	7,462	33	1	22	7	3	18	9	3	6	16	1	6	1	9	3	1	8	8	155	71	4·43	16·34	20·77	26·38
Dinapore	532	5	...	1	...	...	1	...	...	...	...	...	...	...	...	...	1	1	2	11	...	9·40	11·28	20·68	...
Segowlie	306	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	3·27	3·27	...
Benares	569	1	...	...	1	...	...	...	1	1	1	...	2	...	...	...	...	...	...	7	...	1·76	10·54	12·30	...
Chunar	64	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	15·63	...	15·63	...
Goruckpore	667	...	1	2	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	6·00	6·00	...
Fyzabad	686	...	...	...	...	...	1	1	1	...	1	...	...	...	...	...	...	2	1	7	...	...	10·20	10·20	...
Lucknow	1,767	3	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	1	7	...	1·70	2·26	3·96	...
Seetapore (11 Months)	427	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	3	...	2·34	4·69	7·03	...
Futtehghur	164	...	...	...	...	...	...	1	...	1	1	...	1	...	...	...	...	...	...	4	...	...	24·39	24·39	...
Cawnpore	987	1	1	...	...	...	...	...	...	...	5	...	1	...	...	...	...	...	...	8	...	1·01	7·10	8·11	...
Allahabad	901	7	...	3	...	2	1	1	...	...	...	1	...	...	...	...	...	...	...	15	...	7·77	8·88	16·65	...
Nagode	146	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	6·85	6·85	...
	7,180	19	3	7	1	3	3	3	3	2	8	1	5	...	...	...	2	5	4	69	39	2·65	6·96	9·61	13·38
Shahjehanpore	337	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2·97	2·97	...
Bareilly	939	...	...	...	1	...	1	...	...	...	...	...	1	...	...	...	...	1	...	4	...	...	4·26	4·26	...
Moradabad	408	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2·45	2·45	...
Almorah	665	...	...	1	...	...	...	...	...	...	2	...	1	...	...	...	...	...	...	4	...	...	6·02	6·02	...
Chuckrata Road	408	...	...	...	3	...	...	...	...	...	7	...	...	...	...	...	...	...	2	12	...	...	29·41	29·41	...
Deyrah	784	...	...	1	...	...	...	...	...	...	1	...	3	...	...	...	...	1	...	6	...	...	7·65	7·65	...
Roorkee	237	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	4·22	4·22	...
Meerut (10 Months)	970	...	1	1	1	2	1	1	...	...	1	...	1	...	...	1	...	1	...	11	...	...	11·34	11·34	...
Allyghur	84	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	2	...	...	23·81	23·81	...
Delhi	638	...	1	7	5	2	...	2	...	...	...	...	...	1	...	2	...	1	...	21	...	...	32·92	32·92	...
	5,349	...	2	10	13	4	2	3	...	...	12	...	6	2	...	3	...	4	2	63	37	...	11·78	11·78	15·78
Agra	950	7	2	5	2	3	...	...	...	1	...	...	...	...	...	1	...	...	...	21	...	7·37	14·74	22·11	...
Morar	1,410	18	...	...	1	7	1	5	...	...	4	...	...	1	...	1	...	...	...	38	...	12·77	14·18	26·95	...
Seepree (10 Months)	245	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	4·08	...	4·08	...
Nowgong	267	...	...	...	1	...	...	2	...	...	...	...	...	...	...	...	...	...	...	3	...	...	11·24	11·24	...
Jhansi	619	1	2	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	1	6	...	1·61	8·08	9·69	...
Lullutpore	77	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	None	...	...	...	...	...
Deolee	197	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	2	...	...	10·15	10·15	...
	3,725	27	4	5	6	10	2	7	...	1	4	...	...	1	1	2	...	...	1	71	35	7·25	11·81	19·06	21·20
Umballa	913	...	...	2	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	3	...	...	3·29	3·29	...
Simla (7 Months)	142	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	None	...	...	...	...	...
Loodianah	87	...	...	...	...	...	2	...	...	...	...	...	1	...	...	...	...	...	...	3	...	...	34·48	34·48	...
Phillour (6 Months)	83	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	12·05	12·05	...
Jullundur (11 Months)	476	...	...	1	...	...	3	...	...	...	1	...	...	...	...	...	...	2	...	7	...	...	14·71	14·71	...
Ferozepore (10 Months)	594	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	2	...	...	3·37	3·37	...
Mooltan	946	...	...	1	2	...	...	...	...	...	1	...	...	...	...	1	2	...	1	8	...	...	8·46	8·46	...
Sealkote (10 Months)	1,002	...	...	1	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	3·00	3·00	...
Dhurmsalla	582	...	6	5	...	...	...	1	...	...	...	...	2	...	1	...	...	...	...	15	...	...	25·77	25·77	...
Bukloh	670	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	2·99	2·99	...
Umritsur	149	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	2	...	...	13·42	13·42	...
Meean Meer	1,269	...	...	13	...	...	5	1	2	...	2	...	...	...	...	...	...	1	1	25	...	...	19·70	19·70	...
Jhelum	1,599	...	...	3	1	...	1	...	...	...	1	...	1	...	...	...	...	2	...	9	...	...	5·63	5·63	...
Rawulpindee	1,138	...	...	5	2	...	...	...	...	...	6	1	...	...	...	...	1	...	...	15	...	...	13·18	13·18	...
Tullagunge (11 Months)	587	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	1·70	1·70	...
Attock	101	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	1	...	3	...	...	29·70	29·70	...
Murree (8 Months)	101	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	None	...	...	...	...	...
Nowshera	1,042	...	...	3	...	...	2	1	...	...	3	...	...	...	...	...	...	...	...	9	...	...	8·64	8·64	...
Peshawur	3,380	112	...	18	12	...	15	10	...	1	14	3	...	...	...	4	1	5	...	195	...	33·14	24·55	57·69	...
Troops on march, Punjab	...	1	1	...	2	1	1	...	...	...	3	1	2	...	...	1	...	1	1	15	...	...	...	...	...
	15,413	113	7	53	20	1	34	16	2	1	32	5	7	...	1	6	4	13	3	318	80	7·33	13·30	20·63	22·14
Army of the Presidency	40,080	196	17	99	48	22	60	39	8	10	79	7	24	4	11	14	7	30	18	693	245	4·89	12·40	17·29	20·41
Central India Force	4,010	38	...	11	5	1	6	1	1	...	4	...	1	...	...	...	...	10	...	78	11	9·47	9·98	19·45	18·09
Punjab Frontier Force	10,217	142	2	30	12	10	10	5	1	1	16	1	5	1	2	5	2	9	5	259	71	13·90	11·45	25·35	26·72

NATIVE TROOPS, 1869.

XIII.

TABLE showing the PREVALENCE of CHOLERA in each MONTH, and the DISTRIBUTION of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength during the period of occupation.	Number of Admissions into Hospital in each Month.												Total Admissions of the Year.	Admission rate per cent. of Strength for each Province.	Total Deaths of the Year.	Died per 1,000 of Average Strength in each Province.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Fort William	620	...	2	...	1	1	...	...	...	...	...	...	...	4	·88	3	4·43
Allpore	797	...	2	...	2	...	1	...	...	...	...	...	...	5		2	
Dum-Dum	420	...	...	...	...	1	...	...	...	...	...	...	...	1		1	
Barrackpore	826	...	...	1	...	...	...	...	1	...	...	...	...	2		1	
Berhampore	147	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Dacca	331	...	2	2	1	2	3	...	1	...	...	1	1	13		7	
Cachar	319	...	...	...	1	...	...	...	...	...	...	...	...	1		1	
Shillong (10 Months)	818	...	...	...	4	1	3	1	...	...	...	...	1	10		3	
Gowhatty	531	...	...	...	...	...	1	...	...	...	...	...	...	1		1	
Tezpore	188	...	...	...	1	...	...	...	...	...	...	...	...	1		...	
Nowgong	86	...	...	...	10	9	...	...	...	...	...	...	...	19		8	
Debrooghur and Upper Assam	845	1	...	...	1	1	3	...	1	...	1	...	...	8		5	
Buxa	611	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Julpigoree (11 Months)	633	...	...	...	1	...	...	...	...	...	...	...	...	1		1	
Bhaugulpore	168	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Dinapore	532	...	6	3	1	3	...	...	2	...	...	...	...	15	·59	5	2·65
Segowlie	300	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Chunar	64	...	...	...	...	...	...	...	1	...	...	...	...	1		1	
Benares	569	...	...	1	...	1	...	...	...	...	...	...	...	2		1	
Goruckpore	667	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Fyzabad	680	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Lucknow	1,767	...	...	...	...	...	1	...	2	...	...	...	...	3		3	
Seetapore (11 Months)	427	...	...	...	3	...	...	...	...	...	...	...	...	3		1	
Futtehpore	164	...	...	1	...	...	...	...	...	...	...	...	...	1		...	
Cawnpore	987	...	...	...	...	...	...	...	2	...	...	...	...	2		1	
Allahabad	901	...	...	...	1	2	2	4	6	...	...	...	...	15		7	
Nagode	146	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Shahjehanpore	337	...	...	...	...	...	...	1	...	...	...	...	...	1	·04	...	...
Bareilly	939	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Roorkee	237	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Chuckrata Road	408	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Almorah	665	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Deyrah	784	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Moradabad	408	...	...	...	...	1	...	...	...	...	...	...	...	1		...	
Meerut (10 Months)	970	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Allyghur	81	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Delhi	638	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Agra	950	...	...	...	...	...	6	3	5	...	...	...	...	14	1·05	7	7·25
Morar	1,410	...	...	...	1	4	1	...	16	...	...	1	...	23		18	
Jhansi	619	...	...	...	...	...	...	...	1	...	...	...	...	1		1	
Seepree (10 Months)	245	...	...	...	...	...	...	...	1	...	...	...	...	1		1	
Nowgong	267	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Lullutpore	77	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Deolee	197	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Umballa	913	...	...	...	...	...	...	...	...	...	1	...	...	1	1·21	...	7·33
Simla (7 Months)	142	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Loodianah	87	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Phillour (6 Months)	83	...	...	...	...	...	...	...	...	1	...	...	...	1		...	
Jullundur (11 Months)	476	...	...	...	1	...	...	...	...	...	...	...	...	1		...	
Ferozepore (10 Months)	594	...	1	...	...	...	...	...	...	...	...	...	...	1		...	
Mooltan	946	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Sealkote (10 Months)	1,002	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Dhurmsalla	582	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Bukloh	670	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Umritsur	149	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Meean Meer	1,269	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Jhelum	1,589	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Rawulpindee	1,138	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Attock	171	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Tullagunge (11 Months)	587	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Murree (8 Months)	102	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Nowshera	1,042	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Peshawur	3,380	...	...	...	...	...	...	...	3	158	17	1	...	179		111	
Out-posts of Peshawur		...	...	...	...	...	...	...	...	...	2	...	...	2		1	
Troops on march, Punjab		...	1	...	...	...	...	...	...	...	...	...	...	1		1	
Troops on march, Bengal and N. W. Provinces		...	3	1	...	...	...	...	...	...	...	...	2	6		4	
	40,080	1	17	9	29	26	21	9	42	160	21	3	4	341	·85	196	4·89
Augur and Out-posts	228	...	...	...	...	1	...	...	3	...	...	...	...	4	...	5	...
Goonah and Out-posts	330	...	1	...	...	...	4	...	...	...	...	...	...	5	...	4	...
Sehore and Out-posts	812	...	...	...	1	1	3	...	...	...	...	...	...	5	...	7	...
Sirdarpore	380	...	...	3	2	1	1	2	1	...	...	...	...	10	...	7	...
Kherwarrah and Kotrah	673	...	...	...	...	...	7	6	1	...	...	...	...	14	...	6	...
Erinpoorah and Out-posts	869	...	...	...	...	...	1	4	...	...	...	...	...	5	...	4	...
Deolee and Out-posts	717	...	...	...	...	...	15	3	2	...	...	...	...	20	...	5	...
	4,010	...	1	3	3	3	31	15	7	...	...	...	...	63	1·57	38*	9·47
Murdan	867	...	...	...	1	...	...	...	...	...	...	2	...	3	...	1	...
Abbottabad	1,421	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kohat	2,395	...	...	...	...	...	...	...	...	...	188	2	...	190	...	136	...
Bannoo	1,098	...	...	...	...	...	...	...	...	...	...	6	...	6	...	5	...
Dera Ismael Khan	1,657	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dera Ghazee Khan	1,591	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rajunpore	405	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bhawulpore	193	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	10,217	...	...	...	1	...	...	...	...	...	188	10	...	199	1·95	142	13·90

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* See note to Table XIV.

ABSTRACT of the RETURNS showing the ADMISSIONS, DEATHS,

1.—*REGIMENTS of BENGAL*

	Regiments and Station of 1869.	Date of Arrival from Station previously occupied.	Regimental Strength.		[illegible]	Invalided		Died		Loss per 1,000	
			Number borne on the Rolls.*	Average Strength present during 1869.		To their homes for change of air.	For Discharge.	With the Regiment.	Absent from the Regiment.	By Invaliding	By Deaths.
1	2nd Native Infantry, Alipore and Fort William	November 1866, from Lucknow ..	713	651	139	16	11	14	10	15·43	33·66
2	14th Native Infantry, Fort William and Alipore	January 1868, from Benares ...	705	588	155	25	9	14	9	12·77	32·62
3	11th Native Infantry, Dum-Dum and Alipore ..	November 1868, from Dinapore ...	772	691	135	18	14	6	5	18·13	14·25
4	9th Native Infantry, Barrackpore	April 1866, from Fyzabad ...	718	672	96	41	16	18	6	22·28	33·42
5	7th Native Infantry, Dacca and Cachar ..	December 1867, from Allahabad ...	739	593	113	42	9	10	5	12·18	20·30
6	44th Native Infantry, Shillong	A Local Corps	911	644	151	12	6	23	5	6·59	30·74
7	Eurasian Battery, Shillong	......	62	62	[illegible]	1	2	1	1	32·26	32·26
8	43rd Native Infantry, Gowhatty with Detachments at Tezpore and Nowgong	A Local Corps	896	820	189	14	8	22	3	8·93	27·90
9	42nd Native Infantry, Upper Assam ...	A Local Corps ...	911	827	132	4	20	14	9	21·95	25·25
10	Assam Mountain Train, Debrooghur (broken up on 31st March 1869)	.....	71	71		.	..	...	...	...	..
11	41st Native Infantry, Buxa	December 1868, from Agra	712	610	[illegible]	24	2	23	8	2·81	43·54
12	6th Native Infantry, Julpigoree	March 1866, from Bhootan	688	660	151	22	6	6	5	8·72	15·99
13	37th Native Infantry, Bhaugulpore (Detachment of 155 men at Berhampore) . ..	December 1868, from Goruckpore	720	671	132	9	5	8	2	6·94	13·89
	Regiments of Bengal Proper and Assam ..		8,566	7,477	142	227	108	158	68	12·61	26·38

2.—*REGIMENTS of BEHAR, BENARES,*

	Regiments and Station of 1869.	Date of Arrival from Station previously occupied.	Number borne on the Rolls.*	Average Strength present during 1869.	[illegible]	Invalided to their homes for change of air.	Invalided for Discharge.	Died with the Regiment.	Died absent from the Regiment.	Loss per 1,000 by Invaliding	Loss per 1,000 by Deaths.
1	32nd Native Infantry, Dinapore	January 1869, from Buxa ...	693	632	70	3	1	11	5	1·44	23·09
2	8th Bengal Cavalry, Segowlie ..	November 1865, from Seetapore ..	479	377	83	22	12	2	1	25·05	6·26
3	5th Native Infantry, Benares	January 1868, from Dacca ...	713	663	91	9	22	8	2	30·86	14·03
4	18th Native Infantry, Goruckpore	December 1868, from Bhaugulpore	696	600	112	14	40	3	7	57·47	14·37
5	38th Native Infantry, Fyzabad	November 1868, from Nagode ...	769	690	74	5	4	5	2	5·20	9·10
6	13th Bengal Cavalry, Lucknow	March 1868, from Peshawur .	475	387	202	8	..	2	2		8·42
7	34th Native Infantry, Lucknow ...	February 1867, from Barrackpore...	718	712	25	11	1	..	2	1·39	2·78
8	39th Native Infantry, Lucknow .	March 1867, from Assam .	747	727	74	3	12	5	1	16·06	8·03
9	17th Bengal Cavalry, Seetapore (Detachment at Fyzabad)	January 1869, from Barrackpore	476	438	119	10	5	5	3	10·50	16·81
10	6th Bengal Cavalry, Cawnpore . .	December 1867, from Sealkote and Wing from Jhansi	457	396	103	7	...	1	2		6·56
11	10th Native Infantry, Cawnpore ..	January 1869, from Mooltan .	733	690	113	5	33	13	5	45·02	24·56
12	11th Bengal Cavalry, Allahabad, with Detachment of 121 men at Barrackpore ...	December 1868, from Umballa .	455	435	47	7	3	1	..	6·59	2·20
13	4th Native Infantry, Allahabad	December 1867, from Jhansi ...	663	635	117	7	46	15	5	69·38	30·16
	Regiments of Behar, Benares, Oude, and Cawnpore ..		8,074	7,322	92	111	179	71	37	22·17	13·38

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* Strength as on 1st April. The Loss by Death and Invaliding is calculated on this strength, and the Admission-rate on the average strength present throughout the year as shown in the second column. See introductory note.

IV.

and INVALIDING of each REGIMENT for the Year.

PROPER, BHOOTAN and ASSAM.

Causes of Admissions into Hospital and of Deaths in Hospital during the Year.

	Total Admissions into Hospital, and Deaths in Hospital during the Year.	Cholera.	Fevers.	Dysentery and Diarrhœa.	Ophthalmia.	Rheumatism.	Venereal Affections.	Scurvy.	Anæmia and Debility.	Guinea Worm.	Dropsy.	Phthisis Pulmonalis.	Apoplexy.	Neuralgic Affections.	Heart Disease.	Bronchitis and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Diseases of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Scabies and Skin Diseases.	Abscess and Ulcer.	Injuries.	Punished.	All other Causes.
1	Admitted ... 908	6	375	200	14	16	16	7	9	...	...	...	...	22	...	33	...	11	...	41	...	4	28	36	49	...	41
	Died																										
2	Admitted ... 914	5	271	258	25	53	25	10	11	1	...	1	...	5	...	54	7	...	1	34	...	6	25	27	93	...	8
	Died																										
3	Admitted ... 936	3	360	255	3	24	20	12	18	...	1	3	...	11	...	38	2	5	...	18	1	*3	24	47	65	.	23
	Died											1															
4	Admitted ... 440	2	233	81	2	22	8	2	4	...	...	...	...	...	...	12	2	13	1	3	...	1	1	7	35	...	11
	Died																										
5	Admitted ... 805	9	328	96	17	60	47	1	14	...	2	2	...	6	...	21	2	3	1	17	...	8	27	62	75	...	27
	Died																										
6	Admitted ... 990	14	300	235	2	31	47	...	8	...	...	1	...	7	3	38	3	89	8	7	...	11	18	63	70	...	20
	Died																										
7	Admitted ... 112	...	29	10	1	10	1	...	...	...	...	...	...	2	1	3	2	3	8	10	1	4	2	8	12	...	5
	Died 1																										
8	Admitted ... 1,549	20	909	133	18	80	28	...	18	...	2	1	...	10	...	27	4	12	1	30	5	7	35	60	151	...	30
	Died											1					1		1								
9	Admitted ... 1,260	6	690	172	25	47	6	...	6	...	2	1	1	9	...	32	2	10	...	37	...	4	30	64	81	1	34
	Died															1											
10	Admitted ... 8	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	4	...	...
	Died																										
11	Admitted ... 846	...	249	170	13	35	17	41	19	3	...	1	1	8	...	23	5	...	1	55	1	...	42	39	100	...	14
	Died											1															
12	Admitted ... 997	1	413	144	16	56	33	6	11	1	...	...	...	10	...	21	3	...	...	28	...	3	55	62	91	...	*43
	Died	1																									
13	Admitted ... 886	...	393	77	10	51	62	2	4	...	...	3	2	5	...	10	7	4	1	7	1	2	54	42	108	...	40
	Died			1			1																				
	Admitted 10,650	66	4,554	1,828	146	436	310	81	122	5	7	13	4	95	4	312	39	150	22	287	9	47	343	517	949	1	305
	Died																										

OUDE and CAWNPORE.

	Total Admissions into Hospital, and Deaths in Hospital during the Year.	Cholera.	Fevers.	Dysentery and Diarrhœa.	Ophthalmia.	Rheumatism.	Venereal Affections.	Scurvy.	Anæmia and Debility.	Guinea Worm.	Dropsy.	Phthisis Pulmonalis.	Apoplexy.	Neuralgic Affections.	Heart Disease.	Bronchitis and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Diseases of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Scabies and Skin Diseases.	Abscess and Ulcer.	Injuries.	Punished.	All other Causes.
1	Admitted ... 480	15	136	58	14	24	108	...	1	...	...	...	...	7	...	19	5	...	...	19	2	5	10	22	24	...	11
	Died		1	1																							
2	Admitted ... 312	...	142	40	5	13	14	...	1	2	...	...	1	...	...	6	5	3	2	5	1	8	6	28	27	.	3
	Died																										
3	Admitted ... 621	2	240	54	7	22	44	1	9	6	...	8	...	4	...	18	2	10	...	15	...	4	19	52	58	.	16
	Died		1																								
4	Admitted ... 673	...	222	25	30	40	26	...	37	...	...	4	...	5	...	20	3	5	2	15	2	3	41	93	75	...	25
	Died																										
5	Admitted ... 511	...	292	54	13	12	18	...	2	...	1	...	...	1	...	10	5	1	...	5	...	5	4	46	0	...	33
	Died			2																							
6	Admitted ... 781	1	* 320	24	25	46	38	...	2	1	...	...	...	...	...	9	...	...	...	20	2	6	22	133	131	...	1
	Died 2																										
7	Admitted ... 209	...	87	15	12	13	10	...	...	...	...	1	...	7	...	5	...	...	...	7	...	...	2	28	12	...	10
	Died																										
8	Admitted ... 540	2	304	41	14	19	13	...	4	...	...	1	...	3	...	8	...	...	1	25	...	1	7	31	56	.	10
	Died											1															
9	Admitted ... 523	4	121	54	12	49	22	6	4	1	...	...	...	3	...	18	2	1	1	44	5	7	12	71	68	...	23
	Died	1																			1						
10	Admitted ... 407	1	112	10	12	11	61	...	6	2	...	...	1	2	...	30	1	...	...	20	..	5	8	56	58	...	5
	Died 1	1																									
11	Admitted ... 712	1	291	106	19	13	14	...	5	...	...	2	...	8	...	18	18	1	3	10	3	8	7	121	51	...	13
	Died																										1
12	Admitted ... 246	1	79	53	5	17	7	...	1	...	...	...	...	...	...	5	1	3	...	4	...	2	7	7	40	...	5
	Died																										
13	Admitted ... 744	11	302	119	9	18	33	1	8	...	...	...	3	...	1	8	2	...	...	1	..	...	17	79	63	...	6
	Died																										
	Admitted ... 6,759	41	2,708	653	177	297	408	8	80	12	1	16	5	40	1	180	44	24	9	190	15	54	162	707	676	...	101
	Died																				1						

* Died while on Detachment duty at Dacca.

† Five of these deaths occurred in the Detachment at Berhampore.

‡ Attacked on the march from Mooltan. The 45th Regiment, which relieved the 10th Native Infantry at Mooltan, lost on the march from Peshawur and after arriva at Mooltan, 8 men from pneumonia. The 15th Madras Native Infantry, marching to Nowgong, was also attacked with pneumonic disease. The Medical Officer of this R giment remarks, that the disease appears to be communicable from one man to another, and that jaundice more or less intense in character, complicated all these cases c pneumonia.

TABLE

3.—REGIMENTS of ROHILCUND

	REGIMENTS AND STATION OF 1869.	Date of Arrival from Station previously occupied.	Regimental Strength.		Admission-rate of 1869 per cent of the Average Strength.	Invalided		Died		Loss per 1,000.	
			Number borne on the Rolls.	Average Strength present during 1869.		To their homes for change of air.	For Discharge.	With the Regiment.	Absent from the Regiment.	By Invaliding for Discharge.	By Deaths.
1	16th Native Infantry (Wing), Shahjehanpore ...	December 1868, from Fyzabad ...	751	345	55	0	7	2	3	9·32	6·66
2	16th Native Infantry (Wing), Moradabad ...	January 1869, from Fyzabad ...		387	61						
3	4th Bengal Cavalry, Bareilly	January 1866, from Peshawur ...	457	385	78	...	19	...	...	41·58	...
4	27th Native Infantry, Bareilly	March 1868, from Peshawur ...	709	634	48	...	21	4	1	29·62	7·05
5	Sappers and Miners, Chuckrata Road, with the Depôt at Roorkee	......	879	645	106	36	14	13	13	15·93	29·58
6	3rd Goorkhas, Almorah	April 1866, from Bhootan ...	761	665	83	17	27	4	2	35·48	7·88
7	Body Guard, Deyrah	......	131	120	168	2	1	1	1	7·63	15·26
8	2nd Goorkhas, Deyrah	January 1869, from Rawulpindee...	749	603	98	4	13	6	1	17·36	9·35
9	14th Bengal Cavalry, Meerut	December 1866, from Cawnpore ...	464	376	102	6	...	5	1		12·93
10	36th Native Infantry, Meerut	December 1866, from Alipore ...	733	718	86	22	3	7	1	4·09	10·91
11	17th Native Infantry, Delhi	November 1867, from Barrackpore	704	613	178	33	10	22	13	14·20	49·72
	REGIMENTS OF ROHILCUND AND MEERUT ...		6,338	5,581	95	126	115	64	36	18·14	15·78

4.—REGIMENTS of AGRA

	REGIMENTS AND STATION OF 1869.	Date of Arrival from Station previously occupied.	Number borne on the Rolls.	Average Strength present during 1869.	Admission-rate of 1869 per cent of the Average Strength.	To their homes for change of air.	For Discharge.	With the Regiment.	Absent from the Regiment.	By Invaliding for Discharge.	By Deaths.
1	1st Native Infantry, Agra	November 1868, from Dum-Dum	737	650	170	8	13	11	6	17·64	23·07
2	40th Native Infantry, Agra	February 1869, from Banda and Nowgong	716	624	29	7	2	15	2	2·79	23·74
3	22nd Native Infantry, Morar	June 1866, from Umballa ...	693	600	278	11	26	17	1	37·52	25·97
4	33rd Native Infantry, Morar	March 1867, from Lucknow ...	761	663	277	12	2	21	4	2·63	32·85
5	1st Bengal Cavalry, Seepree, temporarily, with Detachment of 156 men at Morar ...	December 1867, from Nowgong ...	480	403	160	8	31	1	4	64·58	10·42
6	8th Native Infantry, Jhansi	December 1867, from Bareilly ...	712	586	261	6	20	8	5	28·09	18·26
7	2nd Bengal Cavalry, Deolee, with Detachment of 100 men at Jhansi	December 1864, from Umritsur ...	441	308	[illegible]	8	11	2	1	24·94	6·80
8	7th Bengal Cavalry, Nowgong, with Detachment of 145 men at Nagode	December 1867, from Lucknow ...	460	389	[illegible]	7	13	4	4	28·26	17·39
	REGIMENTS OF AGRA AND CENTRAL INDIA ...		5,000	4,223	[illegible]	67	127	79	27	25·40	21·20

5.—REGIMENTS of

	REGIMENTS AND STATION OF 1869.	Date of Arrival from Station previously occupied.	Number borne on the Rolls.	Average Strength present during 1869.	Admission-rate of 1869 per cent of the Average Strength.	To their homes for change of air.	For Discharge.	With the Regiment.	Absent from the Regiment.	By Invaliding for Discharge.	By Deaths.
1	12th Bengal Cavalry, Umballa	December 1868, from Abyssinia and Malligaum	462	353	84	14	5	2	3	10·82	10·82
2	26th Native Infantry, Umballa	January 1869, from Mehidpore and Augur	708	590	96	48	15	2	5	21·19	9·89
3	13th Native Infantry, Jullundur, with Detachments at Loodianah and Phillour ...	March 1867, from Peshawur ...	717	630	222	8	12	12	6	16·74	25·10
4	15th Native Infantry, Ferozepore	January 1866, from Dorundah ...	707	625	105	4	13	2	1	18·39	4·24
5	15th Bengal Cavalry, Mooltan	January 1866, from Jhansi ...	472	411	144	4	1	2	2	2·12	8·47
6	46th Native Infantry, Mooltan	December 1868, from Peshawur ...	685	646	126	18	14	8	3	20·44	16·06
7	10th Bengal Cavalry, Sealkote	January 1869, from Abyssinia and Malligaum	449	374	97	9	2	2	2	4·45	8·91
8	12th Native Infantry, Sealkote	February 1869, from Jubbulpore ...	607	643	92	8	36	3	2	59·31	8·24
9	1st Goorkhas, Dhurmsalla	March 1867, from Buxa ...	749	670	150	6	23	15	4	30·71	25·37
10	4th Goorkhas, Bukloh	April 1866, from Almorah ...	770	674	92	14	5	2	1	6·49	3·90
11	9th Bengal Cavalry, Meean Meer	December 1866, from Peshawur ...	452	391	258	12	6	4	1	13·27	11·06
12	21st Native Infantry, Meean Meer	August 1868, from Abyssinia ...	721	576	95	9	10	9	1	13·87	13·87
13	35th Native Infantry, Meean Meer	March 1869, from Saugor ...	718	650	128	3	17	19	1	23·68	27·86
14	3rd Bengal Cavalry, Jhelum	December 1868, from Peshawur ...	480	428	152	4	19	1	1	39·58	4·17
15	29th Native Infantry, Jhelum	March 1869, from Shahjehanpore and Moradabad ...	765	671	135	11	11	6	1	14·38	9·15
16	30th Native Infantry, Jhelum	December 1868, from Cawnpore ...	694	642	120	1	23	4	2	33·14	8·64

XIV,—(continued.)

and MEERUT.

	Total Admissions into Hospital, and Deaths in Hospital during the Year.	Causes of Admissions into Hospital and of Deaths in Hospital during the Year.																									
		Cholera.	Fevers.	Dysentery and Diarrhœa.	Ophthalmia.	Rheumatism.	Venereal Affections.	Scurvy.	Anæmia and Debility.	Guinea Worm.	Dropsy.	Phthisis Pulmonalis.	Apoplexy.	Neuralgic Affections.	Heart Disease.	Bronchitis and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Diseases of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Scabies and Skin Diseases.	Abscess and Ulcer.	Injuries.	Punished.	All other Causes.
1	Admitted ... 188	1	100	18	1	4	15	...	1	...	...	2	...	1	...	2	1	...	2	2	...	...	4	14	10		10
	Died ... 1	...	1																								
2	Admitted ... 235	1	127	23	5	7	15	...	...	...	...	1	...	3	...	...	...	1	1	2	...	2	...	22	8		17
	Died ... 1		1																								
3	Admitted ... 300	...	62	24	16	11	30	...	...	...	1	...	...	...	...	7	3	2	...	9	...	3	5	20	74		11
	Died ...																										
4	Admitted ... 305	...	70	21	14	11	55	...	1	...	...	...	...	3	...	3	...	4	...	4	...	2	20	43	43		11
	Died ... 4		1	1			1																				
5	Admitted ... 1,073	...	639	74	10	36	23	...	51	...	...	...	2	9	...	16	26	1	...	25	...	1	26	42	60	..	26
	Died ... 13		4																								
6	Admitted ... 536	...	236	33	20	56	28	...	1	...	...	1	...	5	...	19	8	1	...	21	3	9	6	43	38	...	8
	Died ... 4		1									1															
7	Admitted ... 202	...	62	33	3	6	6	...	1	...	1	...	...	4	...	12	1	3	1	11	1	2	4	17	31	..	3
	Died ... 1															1											
8	Admitted ... 665	1	243	32	58	25	30	...	7	...	...	4	...	2	...	11	10	21	9	17	...	1	11	39	102		30
	Died ... 6		1														1										1
9	Admitted ... 384	...	135	23	6	16	16	3	3	...	...	...	1	5	...	67	2	1	2	7	..	5	10	35	38	...	9
	Died ... 5		2										1														
10	Admitted ... 320	...	147	41	14	8	26	2	8	...	...	...	1	1	...	8	8	...	...	12	...	...	7	21	16	...	9
	Died ...		1						1				1														
11	Admitted ... 1,090	...	737	66	2	11	...	...	16	...	3	1	3	2	...	10	1	17	...	6	...	5	9	69	15	...	80
	Died ... 22		12																								
	Admitted ... 5,307	3	2,578	388	151	191	250	5	88	...	5	9	7	35	...	164	60	51	15	116	4	30	102	385	441	..	220
	Died ... 64		21								2	1	1												2		4

and CENTRAL INDIA.

	Total Admissions into Hospital, and Deaths in Hospital during the Year.	Cholera.	Fevers.	Dysentery and Diarrhœa.	Ophthalmia.	Rheumatism.	Venereal Affections.	Scurvy.	Anæmia and Debility.	Guinea Worm.	Dropsy.	Phthisis Pulmonalis.	Apoplexy.	Neuralgic Affections.	Heart Disease.	Bronchitis and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Diseases of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Scabies and Skin Diseases.	Abscess and Ulcer.	Injuries.	Punished.	All other Causes.
1	Admitted ... 1,108	6	442	71	26	62	54	...	25	...	...	2	...	5	...	29	10	4	1	31	...	7	27	133	147	..	26
	Died ... 11	3	1						1			1						2									1
2	Admitted ... 1,419	8	755	231	32	40	30	...	...	...	...	..	3	1	...	3	2	3	...	10	...	2	19	149	124	...	16
	Died ...	1																									1
3	Admitted ... 1,516	13	942	173	15	31	60	1	36	1	1	...	13	6	...	16	5	10	...	11	2	3	10	116	31	...	21
	Died ...	10		1					1		1																
4	Admitted ... 1,804	10	1,113	158	14	39	61	47	1	1	...	2	12	19	1	20	7	8	...	13	...	1	28	84	122		43
	Died ... 23																1										
5	Admitted ... 681	1	454	42	16	22	13	2	...			...	3	1	...	6	5	1	...	6	3	2	8	30	57	...	3
	Died ... 1	1																									
6	Admitted ... 1,532	2	1,046	144	10	21	84	5	3	..	...	1	...	3	...	8	1	5	2	5	2	...	14	58	108	...	10
	Died ...	1	1																								1
7	Admitted ... 980	...	599	70	6	27	43	3	1	1	...	...	...	...	...	4	2	...	1	13	...	2	13	66	115	...	3
	Died ... 2		1																								
8	Admitted .. 985		588	50	9	20	47	...	13	...	...	...	4	11	...	9	4	4	4	22	...	4	11	71	105	...	9
	Died ...						1																				
	Admitted ...10,014	40	5,939	930	128	262	391	58	79	3	1	5	35	46	1	95	36	35	8	111	7	21	130	704	809	...	131
	Died ... 73	27	11	11			1																		1		

the PUNJAB.

	Total Admissions into Hospital, and Deaths in Hospital during the Year.	Cholera.	Fevers.	Dysentery and Diarrhœa.	Ophthalmia.	Rheumatism.	Venereal Affections.	Scurvy.	Anæmia and Debility.	Guinea Worm.	Dropsy.	Phthisis Pulmonalis.	Apoplexy.	Neuralgic Affections.	Heart Disease.	Bronchitis and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Diseases of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Scabies and Skin Diseases.	Abscess and Ulcer.	Injuries.	Punished.	All other Causes.
1	Admitted ... 295	...	118	13	20	21	16	...	1	...	...	...	...	1	...	6	1	3	...	7	1	8	10	22	41	...	6
	Died ... 2		1																								
2	Admitted ... 505	1	327	41	15	30	17	1	1	...	...	...	1	...	...	7	10	3	1	6	...	...	14	38	44	...	8
	Died ... 2		1																								
3	Admitted ... 1,403	3	915	151	11	27	43	1	7	1	1	2	...	11	...	13	7	6	.	43	...	4	19	50	72	...	16
	Died ... 12	1																									
4	Admitted ... 657	1	470	10	18	9	7	...	3	1	..	..	..	...	...	6	8	3	..	14	...	4	2	63	20	...	3
	Died ... 2			1																							
5	Admitted ... 592	...	411	18	27	9	5	...	1		...			...	...	3	6	2	...	12	9	2	1	32	47	..	7
	Died ...		1																								
6	Admitted ... 816	...	678	9	8	12	3	...	11	..	...	1	1	1	...	5	12	...	.	5	1	2	5	51	11	...	5
	Died ...																										
7	Admitted ... 302	...	139	15	11	13	25	...	2	3	1	1	1	.	...	1	2	1	..	1	3	5	15	44	71	..	9
	Died ...			1																							
8	Admitted ... 592	1	336	18	7	12	40	...	42	3	...	1	..	6	...	11	..	1	.	1	1	...	19	30	55	...	8
	Died ...		1																								
9	Admitted ... 1,005	...	707	42	25	35	29	3	3	..	...	4	.	..	...	8	1	5	1	27	3	6	3	43	43	...	17
	Died ...			1																							
10	Admitted ... 620	...	308	27	34	28	4	..	9	..	1	..	..	5	...	3	...	10	.	20		2	4	23	116	1	18
	Died ...		1																								
11	Admitted ... 858	...	671	22	19	15	16	1	...	..	...	.	...	5	...	5	...	..	...	6	2	1	4	34	54	..	3
	Died ...			1																							
12	Admitted ... 1,444	...	1,110	73	18	27	28	1	2	..	...	2	..	5	.	9	6	2	3	28	2	3	23	59	40	..	8
	Died ... 3			1																							
13	Admitted ... 1,418	...	1,032	119	32	25	16	1		...		8	.		.	9	7	10	2	14	.	1	17	47	52		6
	Died ... 11								1							1											
14	Admitted ... 566	...	327	24	20	14	12	2	2	...	..	1	.	4	...	7	3	..	.	7	3	3	4	55	67	...	11
	Died ...		1																								
15	Admitted ... 905	...	558	84	17	21	43	...	1	...	...	3	..	3	1	10	5	..	...	20	3	1	13	63	32		18
	Died ... 4		3									1				1											1
16	Admitted ... 919	...	629	32	22	15	17	...	15	..	...	3	..	1	...	7	13		2	27	.	1	16	57	28	...	35
	Died ...		1	1													1										1

* Smallpox.

TABLE

5.—*REGIMENTS of the*

	REGIMENTS AND STATION OF 1869.	Date of Arrival from Station previously occupied.	Regimental Strength.		[illegible]	Invalided		Died		Loss per 1,000	
			Number borne on the Roll.	Average Strength present during 1869.		To their homes for change of air.	For Discharge.	With the Regiment.	Absent from the Regiment.	By Invaliding for Discharge.	By Death.
17	16th Bengal Cavalry, Rawulpindee	March 1868, from Morar ...	480	467	[illegible]	2	1	3	2	[illegible]	[illegible]
18	24th Native Infantry, Rawulpindee	February 1868, from Peshawur ...	707	616	[illegible]	6	17	12	3	[illegible]	[illegible]
19	23rd Native Infantry, Rawulpindee and Huzara	August 1868, from Abyssinia ..	736	501	[illegible]	3	37	4	5	[illegible]	[illegible]
20	20th Native Infantry, Tullagunge*	February 1869, from Meean Meer	696	595	[illegible]	12	14	1	3	[illegible]	[illegible]
21	5th Bengal Cavalry, Nowshera	December 1868, from Seetapore ...	465	458	[illegible]	3	14	11	3	[illegible]	[illegible]
22	31st Native Infantry, Nowshera	November 1868, from Umballa ...	692	611	[illegible]	4	7	3	3	[illegible]	[illegible]
23	Sappers and Miners, 2 & 7 Companies, Peshawur	December 1868, from Roorkee ...	157	157	[illegible]	(8)	...	13	...		[illegible]
24	18th Bengal Cavalry, Peshawur	December 1867, from Rawulpindee	444	386	[illegible]	28	3	30	5	[illegible]	[illegible]
25	19th Bengal Cavalry, Peshawur	November 1866, from Meean Meer	461	370	[illegible]	17	1	15	2	[illegible]	[illegible]
26	3rd Native Infantry, Peshawur	February 1868, from Meean Meer	766	672	[illegible]	6	20	37	4	[illegible]	[illegible]
27	19th Native Infantry, Peshawur	November 1868, from Allyghur ...	706	620	[illegible]	20	11	37	2	[illegible]	[illegible]
28	25th Native Infantry, Peshawur	January 1868, from Delhi ...	710	622	[illegible]	28	19	46	6	[illegible]	[illegible]
29	28th Native Infantry, Peshawur	February 1867, from Meerut ...	708	600	[illegible]	44	13	15	4	[illegible]	[illegible]
		REGIMENTS OF THE PUNJAB ...	17,974	15,559	[illegible]	346	375	320	78	[illegible]	[illegible]
		REGULAR NATIVE ARMY OF THE PRESIDENCY ...	45,952	40,162	[illegible]	877	904	692	240	[illegible]	[illegible]

6.—*REGIMENTS of the*

1	Huzara Mountain Train, Abbottabad ...	April 1867, from Kohat ...	161	149	[illegible]	7	1	...	...	[illegible]	
2	3rd Punjab Infantry, Abbottabad	December 1868, from Kohat ...	737	623	[illegible]	34	29	2	4	[illegible]	[illegible]
3	5th Goorkhas, Abbottabad and Huzara District	Stationary	720	633	[illegible]	3	17	9	3	[illegible]	[illegible]
4	Guide Corps, Murdan	Stationary	1,108	865	[illegible]	27	10	6	4	[illegible]	[illegible]
5	Peshawur Mountain Train, Kohat	March 1869, from Abbottabad ...	160	141	[illegible]	6	2	10	...	[illegible]	[illegible]
6	1. Field Battery, Kohat	December 1868, from Dera Ismael Khan	104	97	[illegible]	4	3	7	1	[illegible]	[illegible]
7	4. Garrison Company, Kohat	Stationary	74	63	[illegible]	3	4	6	...	[illegible]	[illegible]
8	4th Punjab Cavalry, Kohat	March 1869, from Bunnoo ...	500	320	[illegible]	24	11	25	2	[illegible]	[illegible]
9	1st Punjab Infantry, Kohat	December 1868, from Dera Ismael Khan	730	617	[illegible]	33	20	26	4	[illegible]	[illegible]
10	2nd Punjab Infantry, Kohat	November 1868, from Abbottabad	700	623	[illegible]	35	32	30	8	[illegible]	[illegible]
11	4th Punjab Infantry, Kohat	February 1869, from Dera Ismael Khan	732	632	[illegible]	59	10	29	3	[illegible]	[illegible]
12	2. Field Battery, Bunnoo†	December 1868, from Kohat ...	105	90	[illegible]	4	2	1	2	[illegible]	[illegible]
13	1st Punjab Cavalry, Bunnoo	February 1869, from Dera Ismael Khan	479	390	[illegible]	9	9	12	2	[illegible]	[illegible]
14	2nd Sikhs, Bunnoo	January 1869, from Dera Ghazee Khan	745	606	[illegible]	23	6	11	3	[illegible]	[illegible]
15	4th Sikhs, Bunnoo	February 1869, from Dera Ghazee Khan	736	631	[illegible]	3	2	8	6	[illegible]	[illegible]
16	3. Field Battery, Dera Ismael Khan ...	January 1869, from Bunnoo ...	105	89	[illegible]	1	1	...	...	[illegible]	[illegible]
17	2nd Punjab Cavalry, Dera Ismael Khan ...	February 1869, from Dera Ghazee Khan	484	390	[illegible]	4	7	2	3	[illegible]	[illegible]
18	1st Sikhs, Dera Ismael Khan	November 1868, from Kohat ...	745	600	[illegible]	10	34	5	7	[illegible]	[illegible]
19	5th Punjab Infantry, Dera Ismael Khan ...	January 1869, from Bunnoo ...	744	586	[illegible]	3	8	5	2	[illegible]	[illegible]
20	5th Punjab Cavalry, Dera Ghazee Khan ...	February 1869, from Rajanpore ...	404	380	[illegible]	2	3	1	1	[illegible]	[illegible]

* This station was first

† Now Ed

‡ The ratios of Table I. supersede those

PUNJAB,—(continued.)

	Total Admissions into Hospital, and Deaths in Hospital during the Year.	Causes of Admissions into Hospital and of Deaths in Hospital during the Year.																									
		Cholera.	Fevers.	Dysentery and Diarrhœa.	Ophthalmia.	Rheumatism.	Venereal Affections.	Scurvy.	Anæmia and Debility.	Guinea Worm.	Dropsy.	Phthisis Pulmonalis.	Apoplexy.	Neuralgic Affections.	Heart Disease.	Bronchitis and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis.	Diseases of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Scabies and Skin Diseases.	Abscess and Ulcer.	Injuries.	Punished.	All other Causes.
17	Admitted ... 625		484	31	7	13	20	...	4	..	...	...	...	...	...	19	4	1	1	7	...	...	...	14	11		9
	Died ... [illegible]		2																								
18	Admitted ... 1,377		938	73	25	42	15	1	...	...	...	1	...	2	...	10	7	1	...	52	1	...	45	100	38	..	11
	Died ... [illegible]		1	2												1	1										
19	Admitted .. 521		265	33	9	19	56	...	2	...		...	..	2	1	7	3	5	1	6	1	5	17	48	34	...	7
	Died ... [illegible]		1												1												
20	Admitted ... 232		116	11	14	5	25	...	4	1	..	...	...	...	...	4	2	1	1	6	1	..	4	13	23	...	1
	Died ... [illegible]																										
21	Admitted ... 1,057	...	819	98	8	25	5	..	4	...	1	..	...	...	...	4	2	1	1	8	1	2	3	37	35	...	5
	Died ... [illegible]															1	1										
22	Admitted ... 884	...	613	46	13	22	27	...	9	2	..	..	...	...	...	18	1	3	...	23	...	3	17	44	37	..	6
	Died ... [illegible]		1	1												1											
23	Admitted ... 496	8	339	35	...	16	2	...	8	..	...	...	...	2	...	8	1	8	...	9	...	...	5	21	32	...	2
	Died ... [illegible]		1										1											1			
24	Admitted ... 1,105	31	785	96	16	8	2	1	17	1	...	...	...	2	1	8	4	1	2	7	1	3	6	46	67	...	...
	Died ... [illegible]	[illegible]	1												1	1											
25	Admitted ... 715	22	455	51	9	18	8	...	1	2	...	1	.	7	1	9	3	6	...	24	1	2	5	33	53	...	4
	Died ... [illegible]		1													1					1						
26	Admitted ... 2,100	36	1,624	174	10	29	8	1	4	.	...	1	..	5	...	18	11	38	2	19	..	..	12	46	55	...	12
	Died ... [illegible]	[illegible]														1											
27	Admitted ... 2,005	43	1,479	117	20	19	15	4	51	.	1	1	..	22	2	53	4	35	2	34	2	1	10	40	41	.	9
	Died ... [illegible]			2											1												
28	Admitted ... 1,353	24	958	188	13	32	3	...	1	...	1	2	...	1	...	20	11	4	1	8	...	1	7	33	32	...	13
	Died ... [illegible]								1																		
29	Admitted ... 1,216	20	779	128	14	44	19	...	19	...	...	.	...	...	...	31	8	6	1	29	1	3	11	66	23	...	14
	Died ... [illegible]																										
	Admitted 26,703	190	18,416	1,780	457	603	521	17	224	13	6	32	3	85	6	337	112	165	21	465	37	63	310	1,258	1,274	1	271
	Died ... [illegible]	[illegible]	[illegible]	[illegible]		1		1							1												
	Admitted 59,433	340	34,195	5,592	1,059	1,789	1,880	109	583	33	20	75	54	301	12	1,088	321	425	75	1,169	72	215	1,047	3,631	4,140	2	1,127
	Died ... [illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]			[illegible]				[illegible]											
	PUNJAB FRONTIER FORCE.																										
1	Admitted ... 466	...	341	11	4	2	1	1	..	1		...	..	4	...	1	1	...	...	23	...	1	6	18	48	..	3
	Died ... [illegible]																										
2	Admitted ... 1,238	...	932	50	13	19	11	5	1	6	..	1	..	18	1	12	5	...	...	24	...	1	16	46	68	...	9
	Died ... [illegible]		2																								
3	Admitted ... 1,558	..	1,213	41	45	25	18	...	..	...	1	1	...	17	...	15	10	4	1	24	2	1	5	30	83	8	11
	Died ... [illegible]		1									1						1							1		
4	Admitted ... 1,363	3	681	52	64	36	33	1	32	..	...	4	...	3	1	38	11	9	17	48	4	1	33	80	183	...	29
	Died ... [illegible]	1	1	1								1															
5	Admitted ... 375	13	234	47	4	3	3	...	1	...	1	...	..	...	...	5	1	...		14	1	..	4	20	22	...	2
	Died ... [illegible]		1																								
6	Admitted ... 345	9	196	38	5	13	...	...	8	...	.	..	...	4	...	6	...	...	1	14	...	...	1	18	31	...	1
	Died ... [illegible]								1																		
7	Admitted ... 80	2	51	4	...	5	2	...	3	2	..	...	..	...	..	3	..	...	...	5	...	..	1	1	...	...	1
	Died ... [illegible]																										
8	Admitted ... 625	25	360	31	4	24	6	1	20	2	..	...	...	1	...	9	3	3	1	15	2	4	1	41	66	...	6
	Died ... [illegible]		1						1								1										
9	Admitted ... 1,511	25	1,147	126	16	14	11	2	2	21	...	1	3	3	...	13	3	...	1	13	..	4	4	65	20	...	8
	Died ... [illegible]			1												1											
10	Admitted ... 1,318	84	881	120	8	17	5	...	12	...	...	...	...	5	...	22	4	18	.	31	...	..	31	42	20	...	18
	Died ... [illegible]			1																							1
11	Admitted ... 1,665	31	1,267	100	10	28	7	3	2	14	1	2	1	1	...	9	8	10	2	21	2	2	7	84	48	...	5
	Died ... [illegible]											1															
12	Admitted ... 309	1	239	29	...	5	1	...	...	...	...	..	..	..	...	1	..	2	...	3	1	...	1	11	13	...	2
	Died ... [illegible]	1																									
13	Admitted ... 1,158	4	753	79	12	20	5	1	14	22	..	...	..	16	...	26	1	5	2	30	4	5	10	67	73	.	9
	Died ... [illegible]	1																	1								
14	Admitted ... 1,527	...	1,095	95	9	32	7	1	8	.	..	..	3	9	...	19	17	5	..	54	2	2	13	61	77	...	18
	Died ... [illegible]															1											1
15	Admitted ... 1,821	...	1,339	148	15	10	6	2	8	1	..	1	..	17	...	36	7	6	2	45	...	7	9	65	60	1	27
	Died ... [illegible]		1													1											
16	Admitted ... 202	..	113	16	3	3	4	...	...	1	...	...	...	2	...	4	...	7	...	3	...	1	1	18	23	.	3
	Died ... [illegible]																										
17	Admitted ... 549	.	327	16	6	8	10	1	7	4	...	...	...	6	...	3	1	5	6	5	2	3	10	65	58	...	6
	Died ... [illegible]		2																								
18	Admitted ... 796	...	624	26	8	7	2	...	...	...	..	1	1	1	...	5	9	2	...	8	...	1	7	55	31	...	8
	Died ... [illegible]												1											1			
19	Admitted ... 1,103	...	812	50	18	8	20	...	5	3	..	3	1	9	...	10	8	5	1	25	2	...	12	67	31	...	13
	Died ... [illegible]																1										
20	Admitted ... 763	...	516	10	8	11	7	2	5	3	..	...	..	1	..	1	...	..	...	2	1	2	7	84	93	...	10
	Died ... [illegible]			1																							

occupied in 1869.

wardesabad.

here shown, which are approximate only.

6.—REGIMENTS *of the*

	REGIMENTS AND STATION OF 1869.	Date of Arrival from Station previously occupied.	Regimental Strength. Number borne on the Roll.	Regimental Strength. Average Strength present during 1869.	[illegible]	Invalided. To their Homes for change of air.	Invalided. For Discharge.	Died. With the Regiment.	Died. Absent from the Regiment.	Loss per 1,000. By Invaliding for Discharge.	Loss per 1,000. By Deaths.
21	3rd Sikhs, Dera Ghazee Khan	December 1868, from Peshawur	740	671	[illegible]	8	19	6	11	27·68	22·97
22	6th Punjab Infantry, Dera Ghazee Khan	January 1869, from Kohat	749	603	[illegible]	8	10	4	2	13·35	8·01
23	3rd Punjab Cavalry, Rajanpore	January 1869, from Kohat	480	405	[illegible]	14	15	4	3	30·8[illegible]	11·40
24	Escort, Bhawulpore	...	(193)	(193)	[illegible]			(1)		...	5·18
	Regiments of the Punjab Frontier Force		12,338	10,270	[illegible]	323	255	259	71	20·67	26·75

7.—REGIMENTS *of the* CENTRAL

1	2nd Central India Horse, Augur	406	250*	[illegible]	3		8	1	...	18·11
2	1st Central India Horse, Goonah	494	330	[illegible]	3	5	11	3	10·12	25·31
3	Bhopal Battalion, Sehore	930	812	[illegible]	8	13	10	*4	13·08	15·05
4	Malwa Bheel Corps, Sirdarpore	551	380*	[illegible]	5	6	9	1	10·30	18·15
5	Meywar Bheel Corps, Kherwarrah	706	673	[illegible]	2	16	9	1	22·06	11·16
6	Erinpoorah Irregular Force	800	860	[illegible]	2		11	...	...	12·06
7	Deolee Irregular Force	876	717	[illegible]	1	1	20	3	1·14	23·97
	Regiments of the Central India Irregular Force	4,022	4,031	[illegible]	24	41	78	11	8·22	18·08

* Strength at head-quarters. † See note to Table VIII.

STATEMENT SHOWING THE GAIN AND LOSS IN STRENGTH

Present with their regiments on 1st January 1869	45,008
At their homes on Furlough	1,188
At their homes on Sick Leave	416
Remaining Sick in the Hospitals of other regiments	75
Total Strength on 1st January 1869	46,687

Additions of the Year.

Transfers received from other regiments	60
Recruits received during the year	2,494
Deserters rejoined	12
Total Gain	2,566

ANNUAL RELIEF OF THE

CAVALRY REGIMENTS.

2nd Cavalry	From Deolee and Jhansi	To Bareilly	Arrived	February	1870.
4th Cavalry	„ Bareilly	„ Segowlie	Arrived	December	1869.
8th Cavalry	„ Segowlie	„ Meerut	Arrived	February	1870.
14th Cavalry	„ Meerut	„ Deolee	Arrived	December	1869.
15th Cavalry	„ Mooltan	„ Peshawur	Arrived	December	1869.
19th Cavalry	„ Peshawur	„ Mooltan	Arrived	March	1870.

INFANTRY REGIMENTS.

2nd Native Infantry	„ Alipore	To Julpigoree	Arrived	February	1870.
3rd Native Infantry	„ Peshawur	„ Meerut	Arrived	March	1870.
6th Native Infantry	„ Julpigoree	„ Morar	Arrived	January	1870.

PUNJAB FRONTIER FORCE,—(continued.)

	Total Admissions into Hospital, and Deaths in Hospital during the Year.		Cholera.	Fevers.	Dysentery and Diarrhœa.	Ophthalmia.	Rheumatism.	Venereal Affections.	Scurvy.	Anæmia and Debility.	Dropsy	Phthisis Pulmonalis.	Apoplexy.	Neuralgic Affections.	Heart Disease.	Bronchitis and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis	Diseases of the Digestive System	Diseases of the Urinary System.	Diseases of the Generative System	Scabies and Skin Diseases	Guinea Worm.	Abscess and Ulcer	Injuries	Punished.	All other Causes.
			Causes of Admissions into Hospital and of Deaths in Hospital during the Year.																									
21	Admitted ..	809		640	25	22	16	12	..		..	..	3	6	1	9	3	3		17			17	2	18	37		9
	Died ...		...	1	1	...	...	..		1		..			..	..	..			..	...		..			..		
22	Admitted ..	810	.	531	36	18	24	17	4		..	1	..	3	.	16	2	.		28		5	13	5	37	57		13
	Died ...		...	.	1			..						...	1	...				..		...			..			
23	Admitted .	850	.	566	40	2	11	7	...	1	...		2	4	...	3	4	2	1	15	2	1	9		72	99		9
	Died ...		.		...	..	.			.				..	...	...				...						..		
24	Admitted	388		202	12	2	2	1	6	3	.		1	2	...	1	3	1		17	2		3		23	15		2
	Died ...		..	..	...	...	..	...				..		.	.	...							..					
	Admitted	21,089	197	15,156	1,205	296	352	196	30	132	80	4	20	24	118	31	250	65	82	111	111	20	77	186	1,118	1,265	9	215
	Died ...				1										1													

INDIA IRREGULAR FORCE.

			Cholera.	Fevers.	Dysentery and Diarrhœa.	Ophthalmia.	Rheumatism.	Venereal Affections.	Scurvy.	Anæmia and Debility.	Dropsy	Phthisis Pulmonalis.	Apoplexy.	Neuralgic Affections.	Heart Disease.	Bronchitis and Asthma.	Pleurisy and Pneumonia.	Spleen Disease.	Hepatitis	Diseases of the Digestive System	Diseases of the Urinary System.	Diseases of the Generative System	Scabies and Skin Diseases	Guinea Worm.	Abscess and Ulcer	Injuries	Punished.	All other Causes.
1	Admitted ..	293	4	137	28	10	11	9	1	2	..	..	.	1		3	3	1	5	4		3	6	2	20	36		7
	Died ...			1	..	..		..						...								..	..				..	
2	Admitted ..	161	5	100	15	1	7	5		..	1	..	.	1	.			1	1	1	2		1		2	13	.	5
	Died ...					...	.	...	..	..				.	...										.	..		1
3	Admitted .	1,114	5	725	144	37	24	17		12	..	1		12	.	12	5	2	2	7	2	1	8	2	18	30		9
	Died ...			1		.		...		1		..			..								..		..	..		1
4	Admitted .	446	10	230	28	42	13	2		3	1		...	1	.	5	3						5	32	17	44		10
	Died ...			1	..	..	..	..							..													
5	Admitted .	1,044	14	495	73	32	38	9		3		3	1	10	.	11	2	2	3	7		1	31	85	133	78		10
	Died ...				1	...	..	...								...												
6	Admitted. .	1,120	5	488	74	44	33	150		1		1	2		..	13	1	1	1	57	1	3	10	33	84	95		23
	Died ...				1	..									..	..				..			..		..			
7	Admitted .	1,635	17	938	107	52	45	78	3		...	.	...	4	...	6	4			3	3	10	24	18	99	116		18
	Died ...				..	...		...																				
	Admitted ..	5,813	60	3,113	559	218	171	270	4	21	2	5	3	29	...	50	18	7	12	79	8	18	88	172	403	121		82
	Died ..																											

‡ Occasionally no admission is shown when men are suddenly attacked by cholera at small outposts, or when on detached duty.

³ THE REGULAR NATIVE ARMY OF BENGAL DURING 1869.

PERMANENT LOSS OF THE YEAR.

Deaths at Head-quarters	611
Deaths at Outposts and in Detachments	81
Deaths while on Furlough, &c	99
Deaths while at home on Sick Leave	147
Total Deaths	938
Invalided for Discharge	804
Transfers given to other regiments	33
Discharged otherwise	2,173
Desertions, struck off for bad conduct, &c.	170
Total Loss	4,118
Remaining on the Regimental Rolls on 31st December 1869	41,735

NATIVE ARMY, 1869-70.

INFANTRY REGIMENTS,—*continued.*

8th Native Infantry	From	Jhansi	To	Alipore	... Arrived	December 1869.
9th Native Infantry	„	Barrackpore	„	Lucknow	Arrived	February 1870.
13th Native Infantry	„	Jullundur	„	Barrackpore	Arrived	December 1869.
14th Native Infantry	„	Fort William	„	Jullundur	Arrived	January 1870.
15th Native Infantry	„	Ferozepore	„	Peshawur	Arrived	December 1869.
22nd Native Infantry	„	Morar	„	Fort William	Arrived	December 1869.
23rd Native Infantry	„	Rawulpindee	„	Huzara District	Arrived	August 1869.
28th Native Infantry	„	Peshawur	„	Ferozepore	Arrived	February 1870.
32nd Native Infantry	„	Dinapore	„	Raneekhet Road	Arrived	December 1869.
38th Native Infantry	„	Meerut	„	Peshawur	Arrived	December 1869.
39th Native Infantry	„	Lucknow	„	Jhansi	Arrived	December 1869.

NATIVE TROOPS, 1869.

XV.

TABLE showing the SICKNESS and MORTALITY among the REGIMENTS of the MADRAS NATIVE ARMY serving in STATIONS of the BENGAL PRESIDENCY during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

(Cantoned at Dorundah, Nagode, Banda, Nowgong, Saugor, and Jubbulpore.)

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS IN HOSPITAL.																	
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Disease.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	3,495	121	3·46	11	...	1	1	...	2		...	1	...	...	5	...	...	...		1	...	..	...
February ..	3,717	133	3·55	10	...	...	1	1	1	.	1	3	.	..	1	...	...	...	...	1	..	1	..
March .	3,742	133	3·56	4	...	...	1	..	1	...	...	1	.	..	1	..	.	...	..	...	...	..	..
April ..	3,758	112	2·98	6	...	2	..	.	2		..	1	..	...	1	..	...	..	..	...	..	..	..
May ..	3,691	90	2·44	9	...	1	.	...	1	..	...	...	.	1	2	1	1	.	...	2	...	...	...
June ...	3,673	90	2·45	7	...	...	..	...	1	.	.	...	...	...	1	1	2	1	...	...	...	1	.
July ..	3,667	111	3·03	2	...	1	...	.	1	..	..	...	.	..	..	...	...	..	..	...	.	...	...
August ...	3,705	158	4·26	3	...	2	...	1	...	.	..	..	..	.	...	...	.	...	.	...	...	..	...
September ..	3,704	377	10·18	6	...	...	...	3	2	.	...	...	...	...	.	1	...	..	.	...	...	...	.
October ...	3,757	652	17·35	8	...	...	...	5	1	...	.	2	...	...	...	...	.	..	...	...	.	..	...
November ..	3,782	619	16·37	14	..	...	..	7	4		2	.	...	.	1	.	...	..	..	..	...	...	..
December ...	3,794	364	9·60	3	...	...	...	1	...	...	...	...	...	..	...	1	...	.	...	1	...	...	...
						7	3	18	16	...	3	8	...	1	12	4	3	1	...	5	...	2	.
						Died per 1,000 of the Average Strength.																	
For the year ...	3,710	247	6·66	83	22·37	1·89	·81	9·16		...	·81	2·15	...	·27	3·23	1·08	·81	·27	...	1·35	..	·54	...

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admitted during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	1*	..	..	2	...	1	1	6	1	..	..	...	12	·33	58·33
Smallpox . ..	4	9	25	5	3	1	...	..	.	...	.	...	47	1·27	6·38
Fever, Intermittent .	83	85	82	60	40	41	69	318	880	1,410	975	389	4,441	110·70	·75
„ Remittent and Continued ...	6	7	8	7	10	7	6	5	12	6	6	4	84	2·27	
Apoplexy ..	..	..	...	..	...	...	...	...	...	...	..	...	None	...	...
Dysentery . .	7	6	4	3	6	1	10	8	10	7	15	4	81	2·18	3·70
Diarrhœa	11	9	8	4	2	6	6	22	5	7	6	7	93	2·51	8·60
Hepatitis	...	1	..	.	...	...	...	..	..	...	...	...	1	·03	...
Spleen Disease ..	2	...	1	...	...	.	.	1		2	2	..	11	·29	9·09
Respiratory Diseases ...	16	19	14	4	3	2	3	5	3	6	18	9	102	2·75	11·77
Phthisis Pulmonalis	...	...	.	1	2	1	...	..	1	...	...	...	5	·13	60·00
Dropsy . ..	1	1	...	1	1	1	...	.	.	..	2	...	7	·19	14·29
Scurvy .. .	..	...	..	...	...	...	.	...	...	...	..	...	None	...	...
Rheumatism ..	11	8	21	11	18	23	14	26	12	10	19	14	187	5·04	1·16
Venereal Diseases .	3	6	2	7	5	10	1	7	...	...	3	1	45	1·21	
Eye Diseases .	1	4	7	6	5	6	3	31	21	7	4	3	98	2·64	
Abscess and Ulcer	42	22	28	20	21	48	34	18	14	8	20	13	288	7·76	
Wounds and Accidents	12	7	11	6	12	3	8	6	1	2	6	6	80	2·16	
All other Causes ...	20	37	47	11	14	20	18	21	10	8	24	10	240	6·71	
	220	221	261	148	142	171	173	474	970	1,482	1,100	460	5,831		
	Admitted per cent. of the Average Strength in each Month.														
	6·30	5·90	6·97	3·94	3·85	4·65	4·72	12·79	26·19	39·45	29·08	12·36	157·17		

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* A man of the 15th Madras Native Infantry, who died on the march to Nowgong immediately after leaving Allahabad. The families of this regiment contracted cholera in Calcutta, and twelve cases appeared among them on the journey by railway from Calcutta to Futtehpore. Of the eleven remaining cases of cholera, two occurred at Banda in August, three at Nowgong in June, July and August, two at Saugor in August, and four at Jubbulpore in April, August and September.

3. JAIL POPULATION, 1869.

3. JAILS OF THE BENGAL PRESIDENCY, 1869.

I.

TABLE showing the SICKNESS and MORTALITY among the JAIL POPULATION of the BENGAL PRESIDENCY during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths.															
						Cholera.	Smallpox.	Fevers.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January	58,322	1,418	2·48	150	..	4	1	18	2	41	11	1	1	19	1	13	2	...	13	5	15
February	59,288	1,530	2·58	98	...	5	...	25	1	24	9	...	1	8	...	4	4	..	5	2	10
March	59,443	1,711	2·88	161	...	18	5	60	2	22	13	...	1	11	1	12	2	1	7	3	8
April	59,925	1,785	2·98	145	...	39	...	28	...	22	14	1	2	11	1	9	3	..	4	1	10
May	60,689	1,722	2·84	175	...	45	...	16	27	24	11	1	..	20	...	10	3	...	10	1	7
June	61,643	1,704	2·77	171	...	27	...	16	49	23	12	...	1	10		8	1	...	9	1	11
July	63,022	1,848	2·93	262	...	120	1	6	1	40	21	1	3	11	1	13	1	...	11	4	19
August	64,017	2,100	3·28	275	...	61	...	22	2	82	12	...	2	18	1	9	...	...	21	4	11
September	65,705	2,252	3·43	259	...	21	1	40	...	79	11	3	4	18	2	11	7	1	10	1	20
October	65,428	2,607	3·98	308	...	15	...	56	1	125	33	1	3	27	1	13	4	...	10	3	16
November	63,671	2,500	3·93	352	...	18	..	66	1	117	39	3		37	3	18	6	...	23	1	20
December	62,159	1,809	3·01	208	...	8	...	30	2	111	46	1	3	42	2	15	7	...	17	2	12
						387	8	383*	88	710	295	12	21	232	13	135	16	2	140	28	154
						Died per 1,000 of the Average Strength.															
For the year	61,998	1,924	3·10	2,654	42·81	6·24	·13	6·18	1·42	16·21		·20	·34	3·74	·21	2·18	·74	·03	2·26	·45	2·48

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admissions during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	10	14	53	88	132	67	277	122	67	27	46	20	913	1·47	42·39
Smallpox	22	9	25	25	20	12	1	1	1	1	8	17	142	·23	5·63
Fever, Intermittent ...	1,066	1,219	1,438	1,637	1,648	1,481	1,804	2,842	3,491	5,163	3,535	1,720	27,046	43·63	·57
„ Remittent and Continued ...	113	327	492	221	149	112	54	63	111	163	124	71	2,000	3·23	11·45
Apoplexy	2	3	4	1	94	191	6	1	1	1	1	2	307	·50	28·66
Dysentery	278	217	300	421	374	444	730	972	763	708	711	527	6,530	10·53	8·58
Diarrhœa	203	218	434	456	889	402	626	807	472	335	411	433	5,186	8·36	
Hepatitis	6	10	8	8	10	6	5	2	7	4	3	3	69	·11	17·39
Spleen Disease ...	22	23	27	38	19	28	37	32	37	45	55	33	396	·64	5·30
Respiratory Diseases ...	171	146	184	116	140	135	113	104	123	159	220	230	1,888	3·05	12·29
Phthisis Pulmonalis ...	18	23	20	27	23	24	19	20	29	23	33	27	286	·46	47·20
Dropsy	15	5	14	7	16	3	10	13	17	14	11	19	144	·23	31·95
Atrophy and Anæmia ...	47	34	40	28	70	61	17	69	59	62	55	65	646	1·04	21·67
Scurvy	20	33	28	14	35	22	43	22	12	12	18	7	266	·43	·75
Rheumatism ...	126	84	119	118	101	99	122	89	114	103	102	96	1,273	2·06	1·12
Venereal Diseases ...	81	86	96	101	115	117	115	104	102	79	86	82	1,164	1·88	
Eye Diseases ...	43	48	74	105	108	12	76	91	113	75	82	39	894	1·44	
Abscess and Ulcer ...	453	433	600	511	573	703	766	526	193	303	303	390	5,984	9·65	
Wounds and Accidents	203	174	190	218	202	219	215	199	180	133	137	129	2,208	3·56	
All other Causes ...	520	603	504	641	623	624	616	490	309	349	331	344	5,837	9·41	
	3,418	3,608	4,745	4,811	4,839	4,695	5,682	6,560	6,521	7,844	6,284	4,263	63,170		
	Admitted per cent. of the Average Strength in each Month.														
	5·86	6·08	7·98	8·08	7·97	7·62	8·86	10·17	9·93	11·99	9·87	6·86	101·91		

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* Out of the Fever Deaths of the first six months, 163 in number, 88 were caused by an outbreak of Jail Fever in the Jail at Rawulpindee.

JAILS OF THE BENGAL PRESIDENCY, 1869.

II.

TABLE showing the SICKNESS and MORTALITY among the JAIL POPULATION in LOWER BENGAL and in ASSAM during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January	15,036	630	3·52	55	...	4	...	3	1	..	17	6	...	...	4	...	8	2	...	6	...	4
February	15,108	562	3·72	40	...	5	...		2	1	11	1	..	..	5	..	3	3	...	3	...	6
March	15,063	610	4·05	57	..	17	...	2	2	1	12	8	...	...	3	1	5	1	..	4	...	1
April	15,033	659	4·38	85	...	30	...	7	4	...	14	8	...	1	5	1	7	3	...	3	...	2
May	15,229	642	4·22	82	...	34	...	1	3	1	14	8	1	...	4	...	5	3	...	5	1	2
June	15,693	587	3·74	52	...	15	...	2	2	...	11	6	...	...	2	...	5	1	...	4	1	3
July ...	16,022	647	4·04	74	.	21	...	1	2	...	16	8	...	1	5	...	6	3	...	5	...	6
August	16,127	656	4·07	80	...	3	..	5	3	2	33	10		1	7	1	4	...	...	9	1	1
September	16,209	604	3·73	61	...	2	1	8	3	...	13	8	1	1	5	1	6	6	..	1	...	5
October	16,294	620	3·81	53	...	2	...	4	1	...	21	7	...	...	7	1	6	...	...	2	...	2
November	16,100	657	4·08	71	..	10	...	4	5	...	15	6	...	...	7	2	8	1	...	9	...	4
December	15,945	557	3·49	75	...	6	...	3	2	1	22	10	1	2	5	...	8	3	...	6	...	6
						149	1	40	30	6	199	86	3	6	59	7	71	26	...	57	3	42
						Died per 1,000 of the Average Strength.																
For the year ..	15,658	611	3·90	785	50·14	9·52	·06	4·47		·39	18·20		·19	·39	3·77	·44	4·54	1·66	...	3·64	·19	2·68

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH. Jan.	Feb.	March.	April.	May.	June.	July.	Aug	Sept.	Oct.	Nov.	Dec.	Total Admissions during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
Cholera .. .	10	13	50	66	85	36	31	11	8	8	20	17	350	2·24	42·57
Smallpox .	1		...	3	4	1	.	.	1	1	..	6	17	·11	5·88
Fever, Intermittent ..	482	463	593	647	558	406	755	804	735	992	966	647	8,108	51·78	·49
„ Remittent and Continued ..	9	11	11	11	15	12	16	14	20	20	14	6	159	1·02	18·87
Apoplexy ..		1	1		1	..		1	1	...	..	1	6	·04	100·00
Dysentery ...	115	100	169	207	165	204	300	255	174	168	176	121	2,160	13·79	7·06
Diarrhœa	83	110	257	228	149	164	231	213	153	110	84	93	1,875	11·97	
Hepatitis . .	5	9	2	1	5	4	.	..	1	...	2	3	35	·22	8·57
Spleen Disease	9	16	16	20	7	11	23	15	14	23	26	12	192	1·23	3·12
Respiratory Diseases ..	49	41	54	66	48	64	36	48	43	52	71	64	619	3·96	9·53
Phthisis Pulmonalis ...	12	12	10	13	16	11	10	9	11	14	13	10	141	·90	50·36
Dropsy .	11	5	7	3	12	1	8	7	13	8	2	10	87	·56	29·89
Atrophy and Anæmia	23	19	26	14	31	27	17	29	25	20	25	21	277	1·77	20·58
Scurvy .	12	25	22	7	14	15	36	17	7	9	7	2	173	1·10	...
Rheumatism	44	37	53	40	48	38	50	43	52	34	39	46	522	3·33	·85
Venereal Diseases	23	24	27	32	36	38	30	30	32	24	34	28	370	2·37	
Eye Diseases ..	14	9	12	18	11	9	15	12	17	15	10	7	149	·95	
Abscess and Ulcer .	82	90	91	80	107	98	102	82	77	65	40	54	968	6·18	
Wounds and Accidents	52	60	51	74	60	63	62	55	48	45	43	31	644	4·11	
All other Causes ..	304	280	294	281	320	205	200	188	170	141	143	126	2,650	16·92	
	1,340	1,328	1,746	18,04	1,692	1,455	1,934	1,837	1,602	1,744	1,715	1,305	19,502		
	Admitted per cent. of the Average Strength in each Month.														
	8·91	8·79	11·59	12·00	11·11	9·27	12·07	11·39	9·88	10·70	10·65	8·18	124·55		

JAILS OF THE BENGAL PRESIDENCY, 1869.

III.

TABLE showing the SICKNESS and MORTALITY among the JAIL POPULATION in the DINAPORE, BENARES, OUDE, and CAWNPORE DISTRICTS during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths.																
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January	18,749	358	1·91	40	...	...	...	3	2	1	15	3	...	1	3	...	4	...	...	2	3	8
February	18,803	400	2·12	26	...	...	...	1	3	...	7	6	...	1	2	...	...	1	..	1	2	2
March	18,773	408	2·10	31	...	1	4	...	2	...	7	5	...	...	2	...	5	...	1	2	1	1
April	19,120	430	2·26	28	...	4	...	...	3	...	7	4	1	...	3	...	1	..	...	...	...	5
May	19,610	419	2·14	45	...	2	...	1	2	15	5	2	...	...	9	...	4	...	...	4	...	1
June	20,185	444	2·20	64	...	5	..	...	4	32	7	4	...	1	2	...	2	1	...	1	...	5
July	20,557	488	2·37	118	...	75	1	..	...	...	13	6	1	2	3	1	3	1	...	3	4	5
August	21,240	548	2·58	88	...	22	...	1	1	...	20	17	...	1	4	...	3	...	..	6	1	6
September	21,660	564	2·60	88	...	4	...	5	4	...	30	17	2	...	8	...	2	...	...	7	1	8
October	21,513	574	2·67	118	...	9	...	6	8	1	55	15	...	2	4	...	4	1	...	4	1	8
November	21,045	537	2·55	100	...	7	...	6	6	1	47	16	...	...	10	..	8	1	...	5	...	2
December	20,720	493	2·38	84	...	...	...	2	1	1	33	19	...	1	9	2	4	1	...	7	1	3
						129	5	25	36	51	252	114	4	9	59	3	40	6	1	42	14	49
						Died per 1,000 of the Average Strength.																
For the year ...	20,172	472	2·34	8·39	41·59	6·40	·25	3·02		2·53	18·14		·20	·45	2·92	·15	1·98	·30	·05	2·08	·69	2·43

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admissions during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	...	...	3	17	9	12	179	61	20	18	21	1	341	1·69	37·83
Smallpox	17	6	22	18	15	7	1	1	...	...	8	9	104	·52	4·81
Fever, Intermittent ...	235	319	356	300	387	322	333	300	510	681	488	273	4,594	22·77	·54
,, Remittent and Continued ...	13	32	20	30	38	41	16	13	29	22	18	14	295	1·46	12·20
Apoplexy	1	1	1	1	71	127	.	..	...	1	1	1	205	1·02	24·88
Dysentery	93	69	136	106	88	92	252	376	234	252	244	208	2,150	10·66	10·00
Diarrhœa	69	69	108	111	111	120	193	220	134	90	132	158	1,515	7·51	
Hepatitis	1	...	1	2	3	1	5	1	1	1	1	...	17	·08	23·53
Spleen Disease ...	10	5	5	10	9	9	10	6	13	6	5	8	96	·48	9·38
Respiratory Diseases ...	43	38	43	30	30	26	30	20	26	34	65	70	455	2·26	12·97
Phthisis Pulmonalis ...	6	9	6	10	6	9	2	5	10	5	15	14	97	·48	41·24
Dropsy	2	...	5	3	3	1	1	4	2	1	2	4	28	·14	21·43
Atrophy and Anæmia ...	13	9	6	7	23	13	15	28	24	22	6	24	190	·94	22·11
Scurvy	1	1	1	...	...	...	2	..	1		3	1	10	·05	10·00
Rheumatism ...	24	8	23	23	15	21	27	19	24	31	32	20	267	1·32	1·44
Venereal Diseases ...	27	28	26	32	43	31	47	31	37	25	27	25	379	1·88	
Eye Diseases ...	14	17	29	34	32	13	27	27	42	17	10	11	273	1·35	
Abscess and Ulcer ...	152	130	155	160	163	283	265	132	128	103	99	114	1,884	9·34	
Wounds and Accidents .	64	53	64	65	57	59	66	66	52	32	46	54	668	3·31	
All other Causes ...	87	96	119	134	103	85	91	93	60	81	73	85	1,107	5·49	
	862	890	1,138	1,093	1,206	1,272	1,582	1,403	1,347	1,432	1,298	1,094	11,675		
	Admitted per cent. of the Average Strength in each Month.														
	4·60	4·71	6·06	5·72	6·15	6·30	7·60	7·03	6·22	6·61	6·16	5·28	72·75		

JAILS OF THE BENGAL PRESIDENCY, 1869.

IV.

TABLE showing the SICKNESS and MORTALITY among the JAIL POPULATION in NAGPORE and CENTRAL INDIA during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January	4,613	173	3·75	14	...	...	...	...	...	...	3	2	1	...	2	...	...	...	...	2	...	4
February	4,675	193	4·13	7	...	...	...	1	1	...	2	2	...	...	1	...	...	...	...	...	...	...
March	4,570	191	4·18	8	...	...	1	...	1	...	2	...	...	...	2	...	...	...	...	1	1	...
April	4,609	197	4·28	7	...	3	...	...	1	...	...	...	...	...	1	...	...	...	...	1	1	...
May	4,605	218	4·73	19	...	9	...	...	1	4	2	...	...	...	3	...	...	...	...	...	...	...
June	4,762	219	4·60	17	..	7	...	1	2	3	3	...	...	...	...	...	...	1	...	...	...	...
July	5,063	244	4·82	49	...	28	...	...	1	...	7	3	...	...	1	...	1	...	...	3	...	5
August	5,202	286	5·50	44	...	16	...	...	3	...	13	5	...	...	2	...	...	...	...	4	1	...
September	5,206	354	6·80	50	...	2	...	3	5	...	24	9	...	2	2	...	1	...	...	1	...	1
October	5,156	411	7·97	50	...	2	...	2	3	...	27	3	...	...	2	...	...	2	...	4	1	4
November	4,755	379	7·96	48	...	...	...	...	4	...	20	6	1	...	5	...	1	...	...	8	...	3
December	4,279	260	6·08	43	...	1	...	1	4	...	25	4	...	...	2	...	2	3	...	1	...	...
						68	1	8	26	7	128	34	2	2	23	...	5	6	...	25	4	17
						Died per 1,000 of the Average Strength.																
For the year... ...	4,795	260	5·42	356	74·24	14·18	·21	7·09		1·46	33·79		·42	·42	4·70	...	1·04	1·25	...	5·21	·83	3·55

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	...	1	...	3	38	19	61	23	2	2	...	1	150	3·13	45·33
Smallpox	1	1	1	1	1	1	...	...	...	...	..	...	6	·13	16·67
Fever, Intermittent ..	164	224	223	218	193	152	213	311	527	720	403	193	3,541	73·85	·23
„ Remittent and Continued ..	4	9	7	18	7	17	11	8	27	27	19	15	169	3·52	15·38
Apoplexy	...	...	...	...	11	2	...	...	...	...	...	...	13	·28	53·85
Dysentery	39	23	47	34	55	82	122	206	216	117	106	78	1,125	23·46	9·34
Diarrhœa	22	11	26	33	68	49	109	118	56	46	44	27	609	12·70	
Hepatitis	...	...	...	...	...	...	...	...	..	1	...	...	1	·02	...
Spleen Disease ..	1	..	...	1	..	2	...	5	3	6	4	2	24	·50	8·33
Respiratory Diseases ...	18	33	41	16	26	18	15	14	16	13	28	21	259	5·40	8·88
Phthisis Pulmonalis ..	...	...	1	...	..	2	...	...	1	1	1	2	8	·17	62·50
Dropsy	1	...	..	..	1	1	1	...	1	3	4	3	15	·29	40·00
Atrophy and Anæmia .	4	...	6	1	7	5	3	7	6	13	13	9	74	1·55	33·78
Scurvy	1	2	...	...	...	...	...	1	2	1	1	1	9	·19	...
Rheumatism ...	19	25	23	34	24	18	14	8	13	12	6	10	206	4·30	·90
Venereal Diseases ...	8	10	15	8	13	12	11	9	10	12	5	11	124	2·59	
Eye Diseases ...	5	4	12	13	8	2	11	15	20	17	5	2	114	2·38	
Abscess and Ulcer ..	73	68	82	96	95	116	107	93	59	93	72	65	1,019	21·25	
Wounds and Accidents...	39	17	26	20	32	26	21	18	24	11	14	20	271	5·65	
All other Causes ...	46	48	52	68	65	75	66	64	36	24	27	37	597	12·45	
	445	470	502	564	644	500	757	900	1,019	1,110	752	497	8,334		
	Admitted per cent. of the Average Strength in each Month.														
	9·65	10·18	12·30	12·24	13·98	12·58	14·95	17·30	19·58	21·70	15·81	11·61	173·81		

JAILS OF THE BENGAL PRESIDENCY, 1869.

V.

TABLE showing the SICKNESS and MORTALITY among the JAIL POPULATION in the AGRA, MEERUT, and ROHILCUND DISTRICTS during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths.																
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January	7,763	104	1·34	12	...	..	1	...	...	...	1	1	...	...	4	1	1	...	...	1	...	2
February	8,105	100	1·23	4	...	...	...	...	1	...	1	..	...	...	...	...	1	...	...	1	...	...
March	8,409	110	1·31	6	...	...	...	1	...	...	1	...	...	...	1	...	...	1	...	...	1	1
April	8,909	155	1·80	10	...	2	...	...	2	...	1	1	...	1	1	...	1	...	...	...	...	1
May	8,708	166	1·89	16	...	...	...	...	4	5	2	...	...	...	3	...	...	...	..	...	..	2
June	9,021	193	2·14	23	...	...	...	...	1	9	2	2	...	.	6	...	.	...	...	2	...	1
July	9,226	218	2·36	12	...	2	...	1	...	...	2	3	...	.	...	..	2	...	...	...	...	2
August	9,541	249	2·61	30	...	12	...	2	1	...	3	5	...	...	2	...	2	...	...	1	1	1
September	9,871	278	2·82	25	...	2	...	1	2	...	8	4	...	...	2	1	1	...	1	1	..	2
October	9,811	263	2·68	29	...	...	...	6	3	...	9	2	...	1	7	...	1	...	...	...	...	...
November	9,464	232	2·45	45	...	...	...	1	3	...	24	4	...	...	6	...	...	1	...	...	..	6
December	9,207	187	2·01	49	...	1	...	1	8	...	19	5	...	...	11	...	...	...	...	3	1	...
						19	1	13	25	14	73	27	...	2	43	2	9	2	1	9	3	18
						Died per 1,000 of the Average Strength.																
For the year	8,992	188	2·09	261	29·03	2·11	·11	4·23		1·56	11·12		...	·22	4·79	·22	1·00	·22	·11	1·00	·34	2·00

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admissions during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	...	...	..	2	...	..	6	18	2	.	..	1	29	·32	65·52
Smallpox	1	...	1	1	.	2	..	..	..	.	..	.	5	·06	20·00
Fever, Intermittent ...	38	67	107	185	235	188	183	258	387	382	205	89	2,324	25·84	·56
" Remittent and Continued ...	4	7	9	16	31	12	8	6	15	29	25	20	191	2·12	13·09
Apoplexy	...	..	.	...	9	51	1	.	..	..	..	.	61	·68	22·95
Dysentery	13	10	14	29	22	14	28	84	68	68	92	57	499	5·55	8·98
Diarrhœa	13	8	17	32	23	32	55	159	72	32	80	91	614	6·83	
Hepatitis	.	1	2	2	2	1	..	.	4	..	.	.	12	·13	...
Spleen Disease .	1	..	1	4	1	1	.	1	3	2	4	6	24	·27	8·33
Respiratory Diseases ...	25	14	25	25	26	24	20	14	31	33	18	34	289	3·21	14·88
Phthisis Pulmonalis .	.	1	1	3	.	1	5	5	3	2	1	1	23	·27	39·13
Dropsy .. .	1	..	1		.	...	..	..		..	1	...	3	·03	66·67
Atrophy and Anæmia .	3	3	.	1	4	2	3	2	.	2	5	5	30	·33	30·00
Scurvy ..	..	...		1	17	2	2	2	..	1	1	2	28	·31	3·57
Rheumatism .	12	3	3	6	5	11	12	5	13	10	15	9	104	1·15	1·04
Venereal Diseases	6	14	14	10	5	15	12	11	8	12	7	7	121	1·34	
Eye Diseases ..	4	3	7	10	11	5	9	9	10	11	48	11	141	1·57	
Abscess and Ulcer	65	73	77	88	76	103	126	98	93	84	51	79	1,016	11·30	
Wounds and Accidents	26	17	27	25	18	37	20	35	25	13	20	11	274	3·05	
All other Causes .	27	22	22	67	40	65	64	65	59	53	31	36	560	6·23	
	239	233	328	507	534	506	554	772	703	737	607	478	6,348		
	Admitted per cent. of the Average Strength in each Month.														
	3·08	2·88	3·90	5·69	6·09	6·27	6·00	8·09	8·03	7·51	6·41	5·14	70·59		

JAILS OF THE BENGAL PRESIDENCY, 1869.

VI.

TABLE showing the SICKNESS and MORTALITY among the JAIL POPULATION in the PUNJAB during the Year 1869, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths.																
						Cholera.	Smallpox	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January	12,182	283	2·33	29	...	...	...	2	7	1	5	2	...	...	6	...	...	...	...	2	2	2
February	12,507	275	2·20	21	...	...	...	1	15	...	3	...	...	...	...	...	...	...	...	...	...	2
March	12,628	394	3·12	59	...	...	...	...	52	1	...	...	...	1	3	...	2	...	...	...	...	...
April	12,554	344	2·74	15	...	...	..	...	11	...	...	1	...	...	1	..	...	...	...	...	...	2
May	12,477	277	2·22	13	...	...	...	2	2	2	1	1	...	..	1	...	1	...	...	1	...	2
June	11,983	261	2·18	15	...	...	...	...	4	5	...	...	...	..	...	...	1	1	...	2	...	2
July	12,154	251	2·07	9	..	...	...	..	1	1	2	1	..	...	2	...	1	...	...	...	...	1
August	12,408	370	2·98	33	...	8	...	3	3	...	7	5	...	..	3	...	...	...	...	1	...	3
September	12,763	452	3·54	35	...	11	...	7	2	...	4	3	...	1	1	..	1	1	...	...	...	4
October	12,652	739	5·84	58	...	2	...	17	6	...	13	6	1	...	7	...	2	1	...	...	1	2
November	12,307	695	5·65	79	...	1	...	31	6	..	11	7	2	...	9	1	1	3	...	1	1	5
December	11,918	372	3·12	47	...	...	...	5	3	...	12	8	...	...	15	...	1	...	...	...	...	3
						22	...	68	112*	10	58	34	3	2	48	1	10	6	..	7	4	28
						Died per 1,000 of the Average Strength.																
For the year	12,381	393	3·18	413	33·36	1·78	...	14·54		·81	7·43		·24	·16	3·88	·08	·81	·48	...	·57	·32	2·26

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admissions during the Year.	Admitted per cent. of Strength.	Died per cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	...	...	...	...	...	...	...	9	25	4	5	...	43	·35	51·16
Smallpox	2	2	1	2	...	1	.	..	...	...	...	2	10	·08	...
Fever, Intermittent ...	146	156	159	287	275	356	320	1,079	1,332	2,388	1,473	508	8,479	68·48	·80
„ Remittent and Continued .	83	268	436	146	58	30	3	22	20	65	48	7	1,186	9·58	9·44
Apoplexy	1	1	2	...	2	11	5	...	...	...	. .	..	22	·18	45·45
Dysentery	18	15	24	45	44	52	22	51	71	98	93	63	596	4·81	7·87
Diarrhœa	16	20	26	52	38	37	38	97	57	57	71	64	573	4·63	
Hepatitis	...	...	...	...	...	...	...	1	1	2	...	. .	4	·03	75·00
Spleen Diseases .	1	2	5	3	2	5	4	5	4	8	16	5	60	·48	3·33
Respiratory Diseases . .	36	16	21	19	10	13	12	8	7	27	47	50	266	2·15	18·05
Phthisis Pulmonalis	...	1	2	1	1	1	2	1	4	1	3	...	17	·14	58·82
Dropsy	...	...	1	1	...	...	...	2	1	2	2	2	11	·09	55·55
Atrophy and Anæmia ..	4	3	11	5	5	14	9	3	4	5	6	6	75	·61	9·33
Scurvy	6	5	5	6	4	5	3	2	2	1	6	1	46	·37	...
Rheumatism ...	27	11	17	15	9	13	19	14	12	16	10	11	174	1·41	1·13
Venereal Diseases .	17	10	14	19	18	21	9	17	15	6	13	11	170	1·37	
Eye Diseases ...	6	15	14	30	44	13	14	28	24	12	9	8	217	1·75	
Abscess and Ulcer .	81	72	95	87	132	103	166	121	76	48	38	78	1,097	8·86	
Wounds and Accidents	32	27	31	34	35	34	43	25	31	32	14	13	351	2·83	
All other Causes .	56	57	107	91	86	94	106	82	74	50	60	60	923	7·46	
	532	681	971	843	763	803	775	1,567	1,760	2,822	1,914	889	14,320		
	Admitted per cent. of the Average Strength in each Month.														
	4·37	5·45	7·70	6·72	6·12	6·70	6·38	12·64	13·80	22·30	15·55	7·43	115·60		

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* With three exceptions, the Deaths from Remittent and Continued Fevers during the first six months occurred in the Rawulpindee Jail; between January and June, 88 prisoners died from contagious fever. In this Jail during the same months, there were 995 Admissions from Fever.

JAILS OF THE BENGAL PRESIDENCY, 1869.

VII.

COMPARATIVE STATEMENT of the RATIOS of SICKNESS and MORTALITY among the JAIL POPULATION of the various PROVINCES of the BENGAL PRESIDENCY.

DISEASES.	BENGAL PROPER AND ASSAM. Average Strength ... 15,658 Daily Sick per cent. of Strength ... 3·90 Admitted per cent. of Strength ... 124·55		BEHAR PROVINCES, BENARES, OUDE, AND CAWNPORE. Average Strength ... 20,172 Daily Sick per cent. of Strength ... 2·34 Admitted per cent. of Strength ... 72·75		NAGPORE AND CENTRAL INDIA. Average Strength ... 4,795 Daily Sick per cent. of Strength ... 5·42 Admitted per cent. of Strength ... 173·81		AGRA, MEERUT, AND ROHILCUND DISTRICTS. Average Strength ... 8,992 Daily Sick per cent. of Strength ... 2·09 Admitted per cent. of Strength ... 70·59		PUNJAB. Average Strength ... 12,381 Daily Sick per cent. of Strength ... 3·18 Admitted per cent. of Strength ... 115·66		BENGAL PRESIDENCY. Average Strength ... 61,998 Daily Sick per cent. of Strength ... 3·10 Admitted per cent. of Strength ... 101·91	
	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Admitted per cent of Average Strength.	Died per cent. of Admissions.
Cholera ...	2·24	42·57	1·69	37·53	3·13	45·33	·32	65·52	·35	51·16	1·47	42·39
Smallpox ...	·11	5·88	·52	4·81	·13	16·67	·06	20·00	·08	...	·23	5·63
Fevers, Intermittent	51·78	·49	22·77	·54	73·85	·23	25·84	·56	68·48	·80	43·63	·57
Fevers, Remittent & Continued ...	1·02	18·37	1·46	12·20	3·52	15·38	2·12	13·09	9·58*	9·44	3·23	11·45
Apoplexy ...	·04	100·00	1·02	24·89	·28	53·85	·68	22·95	·18	45·45	·50	28·66
Dysentery and Diarrhœa ...	25·76	7·06	18·17	10·00	36·16	9·34	12·38	8·95	9·44	7·87	18·89	8·58
Hepatitis ...	·22	8·57	·08	23·53	·02	...	·13	...	·03	75·00	·11	17·39
Spleen Disease ...	1·23	3·12	·45	9·38	·50	8·33	·27	8·33	·48	3·33	·64	5·30
Respiratory Diseases	3·96	9·53	2·26	12·97	5·40	8·89	3·21	14·90	2·15	18·05	3·05	12·29
Phthisis Pulmonalis	·90	50·36	·48	41·24	·17	62·50	·27	39·13	·14	58·82	·46	47·20
Dropsy ...	·56	29·89	·14	21·43	·29	40·00	·03	66·67	·09	55·55	·23	31·95
Atrophy and Anæmia	1·77	20·58	·94	22·11	1·55	33·78	·33	30·00	·61	9·33	1·04	21·67
Scurvy ..	1·10	...	·05	10·00	·19	...	·31	3·57	·37	...	·43	·75
Rheumatism ...	3·33	·98	1·32	1·44	4·30	·90	1·15	1·04	1·41	1·13	2·06	1·12
Venereal Diseases ...	2·37		1·88		2·59		1·34		1·37		1·98	
Eye Diseases ...	·95		1·35		2·38		1·57		1·75		1·44	
Abscess and Ulcer ...	6·19		9·34		21·25		11·30		5·98		9·65	
Injuries ...	4·11		3·31		5·65		3·05		2·83		3·56	
All other Causes ...	16·92		5·49		12·45		6·23		7·46		9·41	
	124·55	...	72·75	...	173·51	...	70·59	...	115·66	...	101·91	..

* See note to Table VI.

JAILS OF THE BENGAL PRESIDENCY, 1869.

VIII.

TABLE showing the GENERAL STATISTICS of SICKNESS and MORTALITY in the JAILS of the BENGAL PRESIDENCY and the Average Daily Sick per cent. of Strength in each Month.

STATIONS.	Average Strength for the Year.	Daily Sick per cent. of Average Strength in each Month.												Daily Sick per cent. of Average Strength for the Year.	Admitted into Hospital per cent. of Average Strength.	Died per 1,000 of Average Strength.		
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			A. Cholera.	B. All other Causes.	C. All Causes.
Alipore ...	2,150	5·16	5·66	5·96	6·30	5·52	5·07	6·30	6·66	5·54	5·33	5·38	4·76	5·63	152·40	13·47	53·88	67·35
Baraset ...	204	2·19	4·96	6·22	5·53	3·50	3·69	4·91	4·19	5·14	3·00	3·72	3·14	4·41	103·92	...	98·04	98·04
Jessore ...	726	2·27	2·49	4·35	4·40	3 28	2·52	3 52	3 35	3·74	3·77	5·74	4·35	3·58	132·23	...	22·04	22·04
Kishnaghur ...	415	1·21	2·32	1·64	2·64	2·98	3·55	2·62	3 66	3·84	2·48	2·57	2·06	2·65	89·87	...	19·28	19·28
Moorshedabad ...	186	8·47	6·29	7·03	5·99	4·07	3·72	5·64	4·98	4·02	8·47	9·60	7·60	6·45	121·51	...	59·14	59·14
Howrah ...	133	2·94	2·13	1·41	2·16	2·14	2 10	2·16	3·03	1·40	1 47	1·61	2·35	2·26	98·72	...	22·56	22·56
Hooghly ...	526	4·03	3·19	4·22	4 28	3·60	2·60	2·97	2·93	3·80	5·65	5·60	5·24	3·99	174·52	7·60	34·23	41·83
Serampore ...	42	...	...	...	...		...	...	...	...	...	...	...	...	...	...	...	...
Bardwan ...	311	2·82	2·66	4·58	4 23	3·55	3·25	4·55	3·72	3·37	6·25	6·01	3·89	4·18	160·77	...	16·08	16·08
Bancoorah ...	422	1·08	1·44	1·90	1·25	1·23	1·79	1·58	1·17	1·07	1·45	1·45	1·21	1·42	86·97	...	7·11	7·11
Purulea ...	187	2·50	1·66	2·63	3 41	4·82	3·33	3·55	4·52	4·06	3·50	3·05	1·84	3·21	115·50	...	21·39	21·39
Raneegunge ...	36	...	...	...	...	..	.	...	...	.	..	...	...	...	...	...	...	...
Sooree ...	217	5·83	4·49	4·40	6·51	7·11	5·02	3·24	8·02	4·83	3·47	4·59	5·85	5·07	131·79	...	41·47	41·47
Rajmohal and Pakour.	101	2·27	1·32	1·27	1·09	1·08	·95	1·79	1·65	·88	2·54	·98	...	·99	63·36	...	20·70	20·70
Deoghur and Sub-Divisions ...	118	..	1·01	1·96	·76	·76	·72	1 74	2·56	2·27	·69	1·08	1·90	1·69	66·11	...	8·47	8·47
Malda ...	93	5·77	8·42	9·88	13·33	8·54	6·06	5·45	5·21	6·67	6·32	7·00	6·98	7·53	356·99	53·76	32·26	86·02
Dinagepore ...	408	3·48	3·42	4·52	4·59	7·58	7 73	5·74	3 59	5 05	7·34	5·85	4·59	5·30	178·43	2·45	75·98	78·43
Rajshahye ...	490	2 30	2·47	2·08	1·77	2·86	2·42	3·03	4·70	3·30	2·00	3·32	1·79	2·86	43·26	...	40·80	40·80
Rungpore ...	391	3·92	3·77	4·30	3·20	6·40	5·18	5 74	5·33	4·61	5·63	5·51	5·13	4·86	133·25	51·15	112·53	163·68
Bograh ...	158	4·22	4·14	4·91	5·03	3 99	3·05	5·23	3·31	1·30	2·56	1·91	2·65	3·40	134·81	25·32	69·62	94·94
Mymensingh ...	527	4 99	4·78	4·35	6·32	1·46	4·50	4·55	4 86	4·55	1·54	4·63	3·51	4·74	118·41	1·90	51·23	53·13
Pubna ...	180	3 73	3·50	5·04	4 55	5·84	3 14	3·85	3·78	3·72	2·68	3·72	2·85	3·89	258·33	11·11	11·11	22·22
Furreedpore ...	342	2·67	2 70	2·37	3·12	2·93	2·27	2·99	2·85	2·31	2 20	1·46	1·58	2·34	96·20	...	29·24	29·24
Backergunge ...	527	4·34	4 33	4·79	5·02	4 92	5·19	5·91	4·74	4·34	5·06	6 95	8·11	5·31	160·72	36·05	81·60	117·65
Noacolly ...	249	3 17	1·59	2 38	2 02	2·14	1·43	2·14	1·59	1·24	1·79	3·29	1·39	2·01	91·16	...	16·06	16·06
Chittagong ...	244	3 90	3·03	4·02	6·46	6·18	4·06	2 81	3·64	3·27	3·35	4·74	3·45	4·10	115·98	8·20	24·59	32·79
Tipperah ...	346	1·59	1·32	1·00	1·15	·58	1·60	·27	1·08	·54	·58	1·90	1·13	1·16	74·57	2·89	20·23	23·12
Dacca ...	468	3·16	5·32	5·53	4·76	4·33	3·73	4·80	4·20	3·42	4·19	4·94	5·00	4·49	117·31	2·14	29·91	32·05
Sylhet ...	385	3·50	3 47	2·77	3 61	2 95	3·53	3·24	3·23	2·77	3·30	4·01	2·99	3·38	117·40	10·39	28·57	38·96
Shillong ...	58	1·69	...	...	...	3·51	1·72	7·02	9·62	6·45	4·92	3·33	6·78	3·45	144·83	189·66	34·48	224·14
Cachar ...	124	5·34	6·60	5·26	7 81	8 20	6·30	7·50	7·64	4·10	6·14	8·73	6·50	6·45	183·87	...	24·19	24·19
Gowalparah ...	98	5·06	3·19	5·41	6·06	7 22	10·75	4·72	4·63	5·88	2·33	3·16	3·74	5·10	173·47	30·61	71·43	102·04
Gowhatty ...	196	2·97	1·69	1·91	3·10	3 32	2·60	3·45	5·88	6·71	5·04	5·11	3·03	3·57	111·22	10·20	117·35	127·55
Seebsaugor .	118	6 59	2·80	3·42	4·98	5 56	5 66	4·20	5·13	5·38	4·35	1·53	1·59	4·24	175·42	...	25·42	25·42
Nowgong ...	61	3·70	3 61	5·88	7·02	12 28	9·37	10·00	4·76	2·86	4·84	1·72	6·15	6·56	168·85	65·57	...	65·57
Tezpore ,	182	3 89	4·65	6·13	8 44	8·28	7·78	6·56	7·61	8·67	6·97	7·73	4·59	6·59	301·10	21·98	21·98	43·96
Debrooghur ..	86	1 10	5·02	3 33	2·35	4·55	2·22	4·04	3·61	5·88	2·00	6·67	4·05	3·40	282·56	23·26	34·88	58·14
Midnapore ...	723	2·67	3·15	3·96	3·25	2 91	2·56	2·67	2·64	1·78	1·53	1·74	·89	2·35	61·13	5·53	22·13	27·66
Balasore ..	160	1·80	1 71	2·75	2 86	4·09	2·84	3·91	5·77	3·91	5·88	6·67	6·52	3·75	150·00	6·25	6·25	12·50
Cuttack ..	327	4·10	4·17	4·20	2 08	2·42	2·30	3·78	4·46	2·86	2·55	1·52	·72	3·06	98·17	3·06	33 64	36·70
Pooree ...	130	3·03	4 80	2·94	2·29	2·34	2·26	4·51	2·36	1·48	·74	1·60	1·68	2·31	80·77	30·77	69·23	100·00
Sumbulpore .	97	7·69	6·10	5·41	7 95	8 51	6·10	6·12	4·51	6·00	7·02	6·52	5·06	6·19	310·31	...	82·47	82·47
Chyebassa ..	104	4 00	4·42	7·41	6·48	8·49	6·06	4·59	2·88	4·85	6·54	4·95	6·90	5·77	103·84	...	38·46	38·46
Ranchee .	312	8·80	13·17	7·78	7 07	6·03	5·19	5 26	4·57	3·19	2·18	3·55	2 68	5·77	147·43	12·82	44·87	57·69
Hazareebaugh, Central	708	1·70	1·71	2·52	5·28	4 01	2·87	2·38	2·83	2·52	2·17	2·06	2·03	2·60	110·05	1·42	19·83	21·25
" District	277	2·62	2·06	2·81	5 53	4 28	3·31	2·22	2·47	3·92	3·42	1·58	1·57	2·89	112·63	...	28·88	28·88
Monghyr ...	356	1·47	2·10	1·77	1 74	1·11	1·14	1·18	1·96	2·44	1·04	1·55	1·35	1·69	54·21	...	39·33	39·33
Bhaugulpore .	209	1·05	2·51	2 85	3 20	3·12	3·17	2·55	2·29	2·00	2·97	2·53	3·49	2·67	54·18	16·72	56 96	73·68
Purneah ...	310	1·62	2·26	1·90	1 09	1 80	1·41	2·60	2·80	3·13	2·19	2·06	3·28	2·26	55·49	3·22	22·59	25·81
Darjeeling ...	52	4 65	2·13	2 13	2·22	2 22	...	..	...	..	1·67	3·33	3·28	1·02	71·15	...	19·23	19·23
	15,658	3·52	3·72	4·05	4 38	4·22	3·74	4·04	4·07	3·73	3·81	4·08	3·49	3·90	124·55	9·53	40·62	50·14
Gyah ...	490	1·96	2·58	1·37	1·49	2 20	3·24	3·23	5·15	5·58	4·46	4·02	4·64	3·27	111·22	6·12	136·74	142·86
Patna ..	488	4·21	4·04	4·25	5·22	1·15	1·15	1·92	3·41	6·46	5·94	5·82	4·40	4·11	130·72	34·25	66·21	100·46
Deegah ...	776	1·55	2·25	3·17	2·54	1·65	1·62	2·21	3·95	3·24	3·33	3·46	2·75	2·58	72·42		42·53	42·53
Arrah ...	398	1·66	1 79	3·22	1·29	2·78	2·15	3·86	4·01	4·28	3·80	2·27	1·95	3·02	109·55	15·08	15·08	30·15
Chumparun ...	260	2·60	1·72	2·56	4·30	3 21	3·58	3·09	3·70	3·85	2·91	2·51	1·37	3·08	112·69	57·69	42·31	100·00
Mozufferpore ..	310	3·28	3·46	5 16	4·10	2·79	3·61	3·02	3·41	2·88	2·43	2·51	1·91	3·23	104·19	19·36	58·06	77·42
Chuprah ..	269	1·52	3·94	5·00	3 08	2·79	3·31	4·66	5·70	3·20	2·65	3·20	2·33	3·35	107·44	66·91	26·03	92·94
Ghazeepore ...	552	·40	·19	·19	·18	·60	·39	·37	·54	·50	·49	·84	·50	·54	13·94	..	21·74	21·74
Benares, Central ..	1,157	2 70	2·78	3·07	2·81	2·24	2·16	2·05	2·30	2·71	2·15	2·20	1·96	2·42	83·92	...	26·79	26·79
" District ...	544	3·16	3·01	3·54	2·91	2·45	2 76	3·09	3·50	3·46	4·48	4·05	4·08	3·31	72·61	3·68	38·60	42·28
Mirzapore ...	271	3·41	2·93	3·46	3 73	3 56	3·14	3·57	3·68	2·84	3·26	3·58	3·50	3·32	87·45	...	40·59	40·59
Azimghur ..	446	1·43	2·54	2·96	3·05	2·11	1·16	1·73	1·54	1·08	1·57	1·28	2·25	1·79	60·00	17·94	56·05	73·99
Jounpore ...	317	2 78	3·73	3·38	3·08	2·57	3·76	2·90	2·57	2·34	3·24	3·30	3·90	3·15	144·46	6·31	28·39	34·70
Goruckpore ..	706	·98	1·56	1·96	2 62	3·46	3·42	7·14	6·09	5·18	5·40	3·05	3·09	3·68	129·74	48·16	117·56	165·72
Bustee ...	130	2·61	2·52	1 82	2·88	3·33	2·34	4·03	2·67	3·40	1·99	2·09	3·18	3·08	85·39	...	15·38	15·38
Gonda ..	654	2·00	2·12	1·98	2·03	2·20	1·80	1·01	·80	·88	·71	1·14	1·54	1·53	45·56	...	21·41	21·41
Baraich ...	176	·64	3·38	2 03	2·67	2·35	1·68	2·08	1·56	1·99	1·94	1·07	1·09	170	78·41	...	..	...
Fyzabad ...	1,180	1·14	1·53	1 64	1·86	1·88	1·30	1 32	1·46	1·42	1·67	3·25	2·52	1·59	71·78	·86	35·59	36·44
Sultanpore .	472	1·02	1·09	·85	1 12	·93	·94	·73	·69	·84	·70	·54	·50	·85	36·59	..	19·07	19·07
Rae Bareilly ...	322	·78	1 15	1·81	1 75	2 01	1 53	2·37	2·40	2·40	2·20	2·25	1·68	1·80	60·55	9·32	18 63	27·95
Pertabghur ...	181	·88	2·10	1·15	1·99	1·35	2·15	1·53	1·50	1·31	2·00	1·57	1·74	1·06	30·22	..	27·62	27·62
Hurdui ...	314	1·10	·60	·51	·62	·29	·20	1 03	·64	·60	·96	1·55	1·22	·64	24·53	...	9·56	9·56
Kheree ..	238	·85	·85	·86	1 45	3 06	2·00	2·05	1·18	1·13	2·00	2·50	2·96	1·68	69·07	...	16·81	16·81
Lucknow, Central ..	1,715	2·07	2 04	2·33	2·11	1·95	2·35	2·23	2·07	2·80	2·37	2·41	2·71	2·33	23·73	1·17	18·07	19·24
" District ..	1,110	1·43	1·77	1·25	1·06	1·03	1·25	1·08	1·24	1·14	1·00	1·83	1·20	1 26	22 25	...	16·22	16·22
Seetapore ...	1,008	1·37	1·87	·79	·98	2·01	1·32	·90	·76	1·06	·03	·77	·82	1·09	48·22	·99	13·89	14·88
Nawabgunge ...	105	1·08	2 15	2·97	1·80	1·85	2·15	2·82	2·44	·76	.	·95	1·57	1·90	73·33	...	...	.
Oonao ...	243	2·78	2·25	2·06	2·44	2·23	3 10	3·23	3·05	1·80	2·58	2·46	2·38	2·47	115·22	4·11	12·35	16·46
Etah ...	212	...	·57	.	·53		·83	·46	·44	·43	·88	·80	·41	·47	23·11	...	4·72	4·72
Humeerpore ...	192	3·16	4·02	3·16	1·90	3 45	7·37	6·22	5·97	6·22	7·14	8·04	8·33	5·21	153·12	..	125·00	125·00
Orai ...	174	2·26	2·19	1·41	1 19	3·66	3 98	3·06	6·17	5·24	6·73	3·57	3·91	4·02	162·06	11·49	40·23	51·72
Futtehghur, Central ..	821	1·01	·72	1·21	2·20	2·53	1·81	3·17	1·07	1·30	1·47	1·25	2·01	1·71	75·64		15·83	15 83
" District ..	402	2·15	2·44	2·70	3·23	3·02	3·15	2·77	3·04	2·86	3·15	2·44	2·50	2·74	96·52	..	19·90	19·90

STATIONS.	Average Strength for the Year.	Daily Sick per cent. of Average Strength in each Month.												Daily Sick per cent. of Average Strength for the Year.	Admitted into Hospital per cent. of Average Strength.	Died per 1,000 of Average Strength.		
		Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			A. Cholera.	B. All other Causes.	C. All Causes.
Cawnpore ...	412	3·50	3·00	1·83	2·08	2·90	2·27	2·62	3·73	4·01	4·50	3·86	4·23	3·40	95·87	..	29·12	29·12
Futtehpore ...	271	2·03	2·74	4·21	3·50	3·89	3·80	3·37	3·45	3·15	4·78	4·10	3·69	3·09	100·52		36·90	36·90
Banda ..	414	4·30	3·72	3·08	3·80	3·36	4·35	3·94	4·26	7·87	8·01	8·62	7·83	5·50	169·56	2·42	84·54	86·96
Nagode ...	116	10·64	10·81	8·33	7·29	7·84	10·43	8·53	10·16	17·83	20·45	20·19	17·07	12·93	229·31	17·24	86·21	103·45
Allahabad, Central ...	1,833	1·80	1·68	1·72	1·77	1·52	1·84	1·81	1·83	1·97	1·95	2·10	1·74	1·80	50·30		31·10	31·10
" District ...	543	1·24	1·34	1·98	1·97	1·50	1·89	1·81	2·94	1·67	1·55	1·73	1·41	1·84	59·85	12·80	35·08	47·88
	20,172	1·91	2·12	2·10	2·25	2·14	2·20	2·37	2·58	2·60	2·67	2·55	2·38	2·34	72·75	6·40	35·19	41·59
Raepore ...	414	3·35	2·55	2·57	2·20	4·02	3·98	3·85	5·88	5·81	12·13	17·65	12·33	6·76	207·01	2·42	38·64	41·06
Belaspore ...	88	7·06	2·70	4·00	5·13	3·48	5·76	1·85	6·12	2·50	2·44	2·94	4·08	4·55		34·09	102·27	136·36
Bandhara	132	3·40	4·35	4·71	2·82	5·61	5·79	3·70	5·81	6·48	4·96	6·92	4·95	4·55	259·09	90·91	83·33	174·24
Chanda ..	149	3·33	3·09	2·84	2·61	5·97	2·86	4·88	4·03	3·05	3·61	2·74	2·61	3·36	108·05	87·25	33·56	120·81
Nagpore ...	820	3·79	4·65	4·13	4·30	5·01	5·00	6·42	6·11	6·06	6·39	4·24	2·70	5·00	173·04	..	31·71	31·71
Chindwarra ...	85	4·17	1·22	1·22	2·47	2·53	1·35	1·17	3·26	2·02	4·21	2·06	1·06	2·35	..	.	23·53	23·53
Wurdah ...	45	8·00	5·88	9·09	3·85	5·17	5·50	8·70	7·69	8·57	7·41	3·57	10·34	6·67		.		...
Sironcha ...	14		...		.	.	.	..	..	...	...	.	.	.	..	...	...	..
Mundla ...	70	2·99	4·02	3·39	1·82	5·45	2·63	5·13	13·58	6·00	4·44	4·41	..	4·29	202·86		57·14	57·14
Jubbulpore ...	851	5·60	6·13	7·11	6·82	7·27	6·98	7·23	6·06	7·65	9·09	9·54	8·29	7·40	182·73	15·28	90·48	105·76
Dumoh ..	108	6·45	7·25	7·16	7·32	7·29	6·93	5·30	4·52	10·49	13·99	10·91	10·42	8·33	240·74	9·26	55·55	64·81
Saugor ..	242	5·07	4·81	5·20	5·06	7·30	8·22	6·22	6·55	8·98	9·30	9·02	6·22	7·02	170·33	12·40	33·05	45·45
Nursingpore ..	142	1·75	2·09	2·13	3·42	·70	1·33	1·12	1·64	3·57	2·09	2·75	1·90	2·11	79·57	.	42·25	42·25
Lullutpore ...	208	·58	1·06	1·55	2·84	2·31	1·93	1·29	2·24	8·00	7·50	5·28	5·70	3·37	177·88	33·65	110·58	144·23
Jhansi	264	1·65	2·23	2·17	2·03	2·24	4·06	2·09	3·86	5·45	5·62	6·28	4·88	3·41	106·06	7·57	79·55	87·12
Seonee	123	1·08	2·13	2·75	2·48	3·10	4·13	3·08	3·47	3·02	3·25	4·13	3·85	3·25	133·33	..	65·04	65·04
Baitool	73	1·41	1·22	...	3·41	1·30	2·56	2·30	...		1·39	1·30	1·54	1·37	42·47	.	41·10	41·10
Sehore	80	3·81	2·78	2·54	2·01	2·83	4·82	8·00	10·17	12·07	12·06	14·49	5·41	5·00	202·50	...	50·00	50·00
Hoshungabad ...	299	3·33	2·90	2·89	2·31	2·01	2·03	2·27	2·63	3·55	5·50	5·38	3·86	3·34	169·23	3·34	36·79	40·13
Nimar .	79	3·30	11·00	6·25	4·81	2·17	2·30	5·43	5·63	7·94	6·90	3·85	9·76	5·00	230·38	...	12·66	12·66
Ajmere ...	308	1·86	2·58	3·37	3·08	3·36	2·87	4·77	6·77	10·02	12·24	11·54	6·91	6·03	146·43	7·54	75·37	82·91
Beaur ..	111	1·65	6·73	8·05	15·70	16·62	8·11	6·12	8·40	10·44	13·38	18·81	13·27	10·81	340·54	81·08	153·15	234·23
	4,705	3·75	4·13	4·18	4·28	4·73	4·60	4·82	5·50	6·80	7·97	7·96	6·08	5·42	173·81	14·18	60·06	74·24
Muttra ...	223	1·75	2·02	1·77	1·94	1·25	2·60	2·22	3·15	2·63	2·70	2·88	2·11	2·24	73·09	..	8·98	8·98
Agra, Central .	1,839	1·04	1·12	1·27	2·30	2·58	3·56	4·28	4·45	4·81	4·22	2·89	2·11	2·94	68·03	2·12	18·00	20·12
" District ..	407	·25	·07	·45	1·08	1·53	2·62	1·92	1·84	1·68	1·34	·79	1·20	1·11	55·73	10·06	40·24	50·30
Etawah .	233	·93	..	·40	·43	·82	1·28	1·34	1·72	1·98	3·28	1·91	·91	1·20	56·65	.	...	...
Mynpoorie ..	365	1·02	·30	·60	1·38	1·17	·52	·78	1·29	1·30	2·61	3·92	2·76	1·64	49·86	2·74	19·18	21·92
Allyghur .	381	2·21	2·44	2·56	2·23	1·04	1·00	1·28	1·91	1·36	1·88	1·69	1·61	1·84	55·38	..	10·50	10·50
Bolundshuhur ..	155	·58	·60	1·44	·64	·60	1·20	1·40	1·81	2·03	1·24	3·18	1·40	1·29	45·17	.	19·35	19·35
Shahjehanpore ..	295	3·10	5·64	2·66	2·72	5·19	3·72	4·24	2·83	2·35	2·79	2·09	2·22	3·05	51·53	3·39	23·73	27·12
Bareilly ...	1,893	1·50	1·39	1·94	2·40	2·14	2·07	1·93	1·89	1·69	1·87	1·92	1·97	1·90	98·10	3·17	23·24	26·41
Budaon ...	394	·85	·66	1·01	1·33	·64	·86	1·50	1·13	1·12	·56	·62	·47	1·02	38·83	..	25·38	25·38
Seharunpore .	203	2·05	1·53	1·38	1·69	2·06	2·04	3·43	10·58	15·09	7·73	7·30	6·15	4·93	106·50	...	59·11	59·11
Bijnore ..	198	1·46	1·90	1·68	1·52	1·51	1·90	2·38	1·57	·80	1·65	1·54	1·17	1·52	86·36	.	10·10	10·10
Deyrah ...	57	.	2·33	...	..	1·92	1·79	1·43	2·09	1·33	...	2·08	...	1·75	52·63	..	35·09	35·09
Almorah ..	132	5·08	4·24	4·31	4·03	5·74	6·07	4·69	4·37	4·00	4·17	4·23	4·20	4·55	170·45		45·45	45·45
Mozuffernuggur .	136	1·87		...	1·65	2·48	1·48	1.50	1·81	2·55	1·65	1·65	1·74	1·47	65·44		66·18	66·18
Moradabad ..	363	·87	1·21	·31	1·40	1·78	1·42	1·50	1·77	1·11	·86	·70	1·04	1·10	50·97	5·51	13·77	19·28
Meerut, Central ..	1,257	1·37	·60	·90	·89	1·15	1·08	1·09	1·89	3·04	3·72	3·58	2·52	1·91	43·00	.	52·51	52·51
" District ..	371	·65	·96	·96	·96	1·27	1·27	·90	1·77	2·81	2·79	3·24	2·13	1·80	79·52	.	26·95	26·95
	8,902	1·34	1·23	1·31	1·80	1·89	2·14	2·36	2·81	2·82	2·68	2·45	2·01	2·09	70·59	2·11	26·92	29·03
Delhi ...	348	2·10	1·64	1·63	2·28	2·15	2·15	2·56	3·27	4·08	6·83	6·46	2·38	3·16	151·15	...	31·61	31·61
Rhotuck ..	214	...	.	..	..	.			·87	·43	·43	1·76	·92	·47	12·61		23·37	23·37
Hissar .	260	·74	·34	·73	·40	2·53	1·61	·40	1·86	1·76	4·17	3·32	2·82	1·54	67·30	.	38·46	38·46
Sirsa ...	315	1·27	1·20	2·15	1·23	1·23	2·85	6·03	3·03	3·50	8·52	8·74	2·33	3·40	107·62	..	6·35	6·35
Kurnaul ...	145	·83	3·81	2·50	2·54	2·04	3·27	2·50	6·96	7·26	4·57	1·71	1·15	3·45	198·62	...	41·38	41·38
Umballa .	669	·71	·28	·41	·79	·82	·82	1·10	2·80	2·79	3·85	5·71	1·93	1·79	74·44	...	14·95	14·95
" Jhugger Gang	312	1·05	·68	·64	1·05	1·56	·88	1·14	1·71	1·24	3·83	2·03	·37	1·28	108·97	...	32·05	32·05
Loodianah ..	225	3·39	3·11	3·43	2·73	2·69	1·54	1·36	2·05	3·21	7·25	6·61	3·52	3·50	198·22	...	13·33	13·33
Jullundur ..	397	·64	·55	1·20	·76	·75	1·00	1·16	1·54	1·37	1·93	2·09	1·66	1·26	38·54	...	17·63	17·63
Ferozepore ...	428	·63	·64	·90	·99	·78	·80	1·23	2·32	2·62	3·73	3·79	1·25	1·64	56·31	...	7·01	7·01
Umritsur ...	583	1·01	1·29	·65	·33	·83	·55	·73	1·05	2·16	6·72	7·32	2·65	2·06	84·57	10·29	42·88	53·17
Lahore, Central ...	2,089	2·47	1·81	1·54	2·11	2·01	3·25	2·49	1·74	3·52	11·01	9·73	5·00	4·16	136·00		27·29	27·29
" Female Jail ...	145	6·45	5·81	4·58	7·14	9·52	7·33	10·42	13·53	13·39	12·69	9·22	6·58	8·97	240·00	13·79	110·36	124·14
Sealkote ..	371	1·98	2·08	2·07	2·09	3·13	2·50	1·83	1·90	2·42	3·00	2·58	1·90	2·41	86·36	...	5·39	5·39
Dhurmsalla ...	123	·88	.	·85	2·48	3·20	6·51	1·72	4·13	6·47	2·22	1·67	·84	2·44	106·50	...	48·78	48·78
Goordaspore ...	321	·83	1·23	2·07	1·04	1·92	1·75	1·70	2·43	2·40	4·29	3·27	1·33	2·18	101·56	...	28·04	28·04
Goojranwalla ...	496	1·31	1·42	1·13	1·10	1·34	1·42	·98	1·67	1·65	2·97	2·61	1·14	1·61	52·01	...	32·26	32·26
Goojrat ..	314	·29	·31	·65	·31	·64	1·52	1·01	1·02	1·28	1·82	1·18	1·19	·96	40·45	.	6·37	6·37
Shahpore ..	367	·31	.	·24	·46	·95	·82	·77	1·72	1·82	1·52	2·01	1·92	1·09	32·97	..	5·45	5·45
Jhelum ...	358	·31	·57	·28	·27	·81	·61	·62	1·98	3·72	4·22	3·39	2·90	1·68	97·76	...	25·14	25·14
Montgomery ...	527	·73	·07	·34	·50	·34	·50	·79	·90	1·44	5·05	4·65	1·84	1·52	60·91	..	18·98	18·98
Mooltan ..	751	1·20	1·16	1·26	1·24	1·59	2·34	1·49	1·11	1·76	2·04	4·10	3·20	1·86	67·51	..	18·64	18·64
Jhung ...	344	·62	·42	·84	·92	1·28	1·36	1·71	1·62	1·24	1·81	5·41	1·99	1·45	44·18	...	14·54	14·54
Dera Ghazee Khan ..	368	2·26	2·01	2·81	4·67	4·02	4·64	4·87	3·12	5·45	6·27	6·80	4·30	4·35	243·20	.	21·74	21·74
Dera Ismael Khan ...	327	2·05	1·72	1·82	3·04	2·71	1·88	2·12	3·09	3·06	4·87	7·17	5·97	3·36	123·55		9·18	9·18
Kohat ..	144	3·31	2·87	5·49	4·52	1·61	·81	1·54	5·88	3·07	3·38	5·52	2·74	3·47	163·19	6·94	62·50	69·44
Bunnoo .	83	·78	·81	5·40	2·94	1·72	4·76	7·25	8·22	11·90	19·23	10·17	5·63	6·02	232·53		36·15	36·15
Rawulpindee ..	943	9·80	10·68	22·07	16·70	8·78	3·66	3·25	4·28	9·16	7·99	6·65	4·92	9·33	278·47		123·01	123·01
Peshawur ..	411	4·15	4·42	4·09	3·23	3·11	3·80	3·02	5·24	8·43	9·88	7·71	5·38	5·35	200·49	31·63	29·20	60·83
	12,381	2·33	2·20	3·12	2·74	2·22	2·18	2·07	2·96	3·54	5·84	5·06	3·12	3·18	115·66	1·78	31·58	33·36
Bengal Presidency ...	61,998	2·48	2·68	2·88	2·98	2·84	2·77	2·93	3·28	3·43	3·98	3·93	3·01	3·10	101·91	6·24	36·57	42·81

JAILS OF THE BENGAL PRESIDENCY, 1869.

IX.

TABLE showing the RATIO in which the PRINCIPAL DISEASES have contributed to make up the ADMISSION-RATE of the year in the JAIL HOSPITALS of the BENGAL PRESIDENCY.

STATIONS.	Average Strength for the Year.	Admitted into Hospital per cent. of Average Strength.												Admitted per cent. of the Average Strength from all Causes.
		Cholera.	Fever, Intermittent.	Fever, Remittent and Continued.	Dysentery and Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Phthisis Pulmonalis.	Dropsy.	Atrophy and Anæmia.	Scurvy.	All other Causes.	
Allipore	2,460	4·24	61·03	·16	34·94	·20	1·31	4·21	1·55	·29	2·82	4·49	34·00	152·86
Barasset	204	·49	20·41	2·45	27·45	...	·98	7·84	·98	...	1·96	...	32·36	103·92
Jessore	726	...	82·51	·14	17·91	·41	2·20	3·44	·55	1·24	·97	...	22·04	132·23
Kishnaghur	415	·48	48·19	·24	14·46	...	2·17	5·78	·72	...	·48	...	17·35	89·87
Moorshedabad	186	...	84·95	2·15	16·67	...			·54	...	...	...	17·20	121·51
Howrah	133		42·86	...	20·30	..	·75	...	1·50	...	6·02	...	17·29	88·72
Hooghly	526	1·90	86·31	·95	36·12	...	5·13	1·52	1·90	·95	·95	...	38·79	174·52
Serampore	42	.	...	...	.	...	..	...	...	...	...	...	...	...
Burdwan	311	...	127·65	...	15·11	...	1·61	·64	·64	·32	·32	...	23·48	169·77
Bancoorah	422	...	24·64	...	·95	...	...	1·42	·24	...	·24	...	9·48	36·97
Purulea	187	...	62·03	·53	16·04	·53	...	3·21	2·14	·53	1·61	...	28·88	115·50
Raneegunge	46	...	...	..	...	...	..	...	...	...	...	...	...	...
Sooree	217	...	47·93	6·91	13·82	...	·46	17·51	1·38	...	3·69	·92	39·17	131·79
Rajmehal and Pakour ..	101	...	33·66	·99	13·86	...	...	1·98	·99	...	..	...	11·88	63·36
Deoghur and Sub-Divisions ..	118	..	27·07	·85	13·56	...	..	·85	...	...	·85	...	22·03	66·11
Malda	93	13·98	124·73	...	89·25	1·08	4·30	8·60	2·15	1·07	...	...	111·83	356·99
Dinagepore	408	·49	74·68	...	31·13	1·71	2·45	8·58	·98	1·71	4·17	...	48·53	178·43
Rajshahye	490	·20	16·94	·41	9·80	·20	1·22	1·02	·61	1·02	1·02	...	10·92	43·26
Rungpore	391	13·56	43·22	·26	46·80	...	·26	3·84	·51	...	6·39	...	18·41	133·25
Bograh	158	3·16	50·49	5·06	29·75	...	2·53	3·80	1·90	·64	4·43	...	24·05	134·81
Mymensingh	527	·57	40·42	·95	29·79	...	·57	4·55	1·71	·19	...	1·71	37·95	118·41
Pubna	180	1·67	100·56	·56	35·55	...	3·88	6·11	...	...	...	...	110·00	258·33
Furreedpore...	342		57·60	...	12·87	...	2·05	2·92	·88	·58	·29	...	19·01	96·20
Backergunge	627	6·07	44·02	·95	67·03	·76	1·33	5·00	·19	1·14	2·47	1·14	20·03	160·72
Noacolly	249	...	42·57	1·20	24·90	...	...	1·20	·40	·40	...	...	20·49	91·16
Chittagong	244	·82	52·48	1·23	25·00	...	...	14·34	1·23	3·28	1·64	...	15·98	115·98
Tipperah	346	·58	26·01	·29	12·14	·29	·87	2·02	·87	...	·58	·58	30·34	74·57
Dacca	468	1·50	37·18	·43	25·21	·64	1·50	3·85	·85	...	·21	3·85	42·09	117·31
Sylhet	385	3·64	30·74	·78	22·34	·26	...	2·34	·26	...	2·08	4·67	41·29	117·40
Shillong	58	20·69	46·55	...	27·59	...	...	..	...	1·73	13·79	...	34·48	144·83
Cachar	124	...	54·84	1·61	53·22	...	·81	4·84	...	·81	2·42	...	65·32	183·87
Gowalparah	98	7·14	65·31	1·02	34·69	...	4·08	7·14	3·06	1·02	12·25	1·02	30·74	173·47
Gowhatty	196	1·53	23·98	...	57·14	...	...	3·06	1·53	1·02	1·53	1·02	20·41	111·22
Seebsaugor	118	.	50·32	3·39	58·47	...	·85	3·39	...	2·54	1·70	...	45·76	175·42
Nowgong	61	19·67	39·34	...	54·10	...	...	6·56	..	1·64	8·20	...	39·34	168·85
Tezpore	182	2·75	86·26	·55	50·55	...	2·20	18·13	1·10	1·65	10·99	1·65	125·27	301·10
Debrooghur	86	3·49	87·21	...	60·46	...	4·65	6·98	...	...	...	...	119·77	282·56
Midnapore	723	1·80	21·30	·69	6·50	·55	·14	2·77	1·38	·14	·28	...	25·58	61·13
Balasore	160	2·50	60·00	...	21·25	...	...	4·37	...	·63	...	1·25	60·00	150·00
Cuttack	327	·31	38·53	·61	17·12	...	·31	2·45	·91	·31	2·45	...	35·17	98·17
Pooree	130	3·85	30·00	...	12·30	...	...	2·31	2·31	·77	·77	...	28·46	80·77
Sumbulpore	97	...	112·37	12·37	97·94	...	1·03	1·03	...	2·06	...	...	83·51	310·31
Chyebassa	104	...	42·31	6·73	31·73	...	1·92	1·92	...	...	...	...	19·23	103·84
Ranchee	312	1·92	51·28	1·92	21·79	...	...	4·17	...	1·61	·96	...	63·78	147·43
Hazareebaugh, Central	706	·71	46·88	·28	10·06	·28	...	1·70	...	...	·71	...	40·43	110·05
" District	277	·36	67·51	...	13·72	...	·36	2·53	...	·36	1·44	...	26·35	112·63
Monghyr	356	.	14·04	.	13·48	...	·84	5·06	·28	·28	·56	...	19·67	54·21
Bhaugulpore	299	2·68	3·68	..	10·37	·33	·33	·33	1·34	·33	1·68	...	33·11	54·18
Purneah	310	·65	13·87	6·13	6·77	...	2·58	3·23	...	1·29	·65	...	20·32	55·40
Darjeeling	52	...	32·69	3·85	9·62	...	...	1·92	...	1·92	...	...	21·15	71·15
	15,658	2·24	51·78	1·02	25·76	·22	1·23	3·06	·90	·56	1·77	1·10	34·01	124·55
Gyah	490	1·43	35·10	...	35·92	·41	·20	2·65	1·02	·20	3·88	·20	30·21	111·22
Patna	438	13·24	40·18	...	39·50	·23	·91	7·31	4·34	·91	1·14	1·14	30·82	139·72
Deegah	776	·77	22·04	2·71	21·52	·13	·77	2·71	1·93	·39	1·03	...	18·42	72·43
Arrah	398	4·52	31·91	1·76	44·98	·50	1·01	4·52	...	1·26	·75	...	18·34	109·55
Chumparun	260	13·08	32·31	..	38·08	...	...	...	...	·38	·38	...	28·46	112·69
Mozufferpore	310	4·84	31·29	...	28·39	...	·32	2·26	...	·32	1·94	·32	34·51	104·19
Chuprah	269	20·82	23·05	...	35·09	...	...	1·12	·37	·37	...	...	26·02	107·44
Ghazeepore	552	...	2·54	·72	5·07	...	·54	...	...	·18	·18	...	4·71	13·94
Benares, Central	1,157	...	28·78	·09	21·95	...	·17	·61	·26	...	·09	...	31·37	83·92
" District	544	·37	18·57	·18	21·69	·18	...	·18	·37	...	·18	...	30·89	72·61
Mirzapore	271	1·11	28·78	1·11	16·23	...	...	·37	...	...	·37	...	39·48	87·45
Azimghur	446	3·14	6·05	·67	13·90	...	·45	1·12	...	·23	...	...	34·53	60·09
Jounpore	317	1·89	32·49	·32	29·02	...	·63	3·47	·63	...	3·16	...	72·87	144·48
Goruckpore	706	10·48	26·06	3·54	54·39	·14	·85	3·26	...	...	3·82	...	27·20	129·74
Bustee	130	...	30·00	...	14·62	...	...	1·54	...	...	...	...	39·23	85·39
Gondah	654	...	16·82	3·06	6·88	...	·15	1·83	·31	...	·15	...	16·36	45·56
Baraich	176	·57	16·48	2·84	14·77	·57	...	1·14	...	...	·57	...	41·47	78·41
Fyzabad	1,180	·25	35·25	1·19	21·78	...	·43	·76	·17	·17	...	...	11·78	71·78
Sultanpore	472	.	14·19	·85	8·69	...	...	·42	...	...	...	...	11·44	35·59
Rae Bareilly	323	2·17	32·92	1·55	12·73	·31	·31	1·55	...	...	·31	...	8·70	60·55
Pertabghur	181	...	7·18	1·66	6·63	·55	...	3·31	...	...	...	...	19·89	39·22
Hurdui	314	...	3·82	·32	6·69	...	...	·96	...	...	·32	...	12·42	24·53
Kheree	238	...	36·55	1·68	12·18	...	1·68	·42	...	·42	...	...	36·14	89·07
Lucknow, Central	1,715	·12	4·43	·17	5·48	·17	·35	5·07	1·46	...	1·69	...	4·79	23·73
" District	1,110	...	4·05	·18	11·62	...	·45	1·26	·90	·18	·27	·09	3·26	22·25
Seetapore	1,008	·40	19·15	2·88	7·34	...	...	1·29	·10	...	·69	·10	16·27	48·22
Nawabgunge	105	...	24·76	1·90	6·67	...	...	2·86	...	...	...	...	37·14	73·33
Oonao	243	2·47	37·45	1·65	21·81	...	·82	1·23	...	...	...	...	49·79	115·22
Etah	212	...	5·66	...	4·25	...	...	·47	...	...	...	...	12·73	23·11
Humeerpore...	193	...	44·27	...	19·27	·52	3·12	6·25	·52	1·04	16·67	...	61·46	153·12
Oraie	174	1·15	67·82	5·75	43·11	...	·57	1·72	·57	·57	·57	...	40·23	162·06
Futtehghur, Central	821	...	13·62	7·92	15·23	...	·61	1·46	...	·12	·12	...	36·66	75·64
" District	402	...	19·65	6·22	17·66	...	...	·75	·25	...	...	...	51·99	96·52
Cawnpore	412	...	28·88	·24	19·90	...	·73	2·43	...	...	·24	...	43·45	95·87

STATIONS.	Average Strength for the Year.	ADMITTED INTO HOSPITAL PER CENT. OF AVERAGE STRENGTH.												Admitted per cent. of the Average Strength from all Causes.
		Cholera.	Fever, Intermittent.	Fever, Remittent and Continued.	Dysentery & Diarrhœa.	Hepatitis.	Spleen Diseases.	Respiratory Diseases.	Phthisis Pulmonalis.	Dropsy.	Atrophy and Anæmia.	Scurvy.	All other Causes.	
Futtehpore	271	...	68·63	...	31·00	...	1·11	5·54	·74	...	·74	·37	52·39	160·52
Banda	414	·24	80·92	·48	19·57	..	3·86	5·31	..	..	1·21	...	57·97	169·58
Nagode	116	2·59	95·69	11·21	35·34	...	2·59	9·48	..	...	·86	...	71·55	229·31
Allahabad, Central	1,833	...	15·33	·65	9·00	·11	·16	3·22	·22	·06	·19	.	21·06	60·80
„ District	543	3·50	21·73	·92	16·02	...	·18	·56	·18	..	·92	..	15·84	59·85
	20,172	1·60	22·77	1·46	18·17	·08	·48	2·26	·48	·14	·94	·05	21·23	72·75
Raepore	414	·24	95·17	2·42	31·88	...	1·21	4·83	...	·24	1·45	...	69·57	207·01
Belaspore	88	4·55	6·82	..	31·82	..	..	.	1·14	...	3·40	...	55·68	103·41
Bandhara	132	18·94	85·61	3·79	46·97	..	2·27	2·27	.	·76	2·27	·76	95·45	259·09
Chanda	149	18·79	39·60	..	14·09	.		..	..	. .	1·34	...	32·22	106·04
Nagpore	820	·12	94·02	·12	18·17	. .	·12	4·15	. .	. .	·61	·24	55·49	173·04
Chindwarra	85	...	..	...	...	. .	..	...	.	. .	. .	.		...
Wurdah	45	. .	...	. .	.	. .	.	.	...	. .	. .		. .	...
Sironcha	14	...	. .	...	.	.	.	..	. .	...	. .	..		...
Mundla	70	..	101·43	...	45·71	. .	1·43	1·43	.		...		52·86	202·86
Jubbulpore	851	2·12	67·15	2·59	66·63	..	·12	13·16	·35	·23	·94	·23	28·01	182·73
Damoh	108	1·85	88·89	...	49·07	·93	·93	3·70	..	. .	1·85	1·85	91·67	240·74
Saugor	242	3·72	80·99	...	37·60		...	1·65	·41	·41	2·48	. .	52·07	179·33
Nursingpore	142	...	19·72	3·52	23·94	. .	.	3·52	. .	.	·70	.	28·17	79·57
Lullutpore	208	6·25	75·00	2·40	53·37	. .	1·44	4·81	·96	...	2·88	·96	29·81	177·88
Jhansi	264	·76	47·73	2·65	17·80	. .	·76	2·65	...	·38	·76	.	32·57	106·06
Seonee	123	...	48·78	...	26·02		. .	5·69	..	.	.		52·84	133·33
Baitool	73	. .	21·92	2·74	4·11		.	...	..	...	1·37		12·33	42·47
Sehore	80	. .	96·25	3·75	30·00	. .	1·25	11·25	.	...			60·00	202·50
Hoshungabad	299	·33	84·95	1·01	29·10	. .	1·67	4·34	.	. .	1·01	..	46·82	169·23
Nimar	79		139·24	1·27	21·52	. .	.	3·79		1·27	1·27		70·88	239·24
Ajmere	398	2·76	45·73	25·38	30·40	...	. .	4·02	...	1·26	·25		36·43	146·23
Beaur	111	31·53	87·39	1·80	83·79	.	.	2·70	·90	1·80	19·82	.	110·81	340·54
	4,705	3·13	73·85	3·52	36·10	·02	·50	5·40	·17	·29	1·55	·10	49·03	173·81
Muttra	223	...	15·25	6·73	8·07		.	1·79	.	...	. .		41·25	73·99
Agra, Central	1,830	·60	21·91	·16	14·71	·44	·44	8·10	·81		·05	1·09	19·09	68·03
„ District	497	1·21	11·07	·20	20·52	·20	·20	3·62	. .		...	·20	18·51	55·73
Etawah	233	...	30·04	·43	9·44	.	·43	·86	...	. .	.	·86	11·59	53·65
Mynpoorie	365	·27	18·30	...	4·08	.	·27	1·37	·27	. .	·55	·55	23·56	49·86
Allyghur	381	...	20·21	·79	8·92	·26		2·89	.	·26	·26		21·70	55·38
Bolundshuhur	155	.	17·42	.	9·03	.	.	. .	.	·65	·65	.	17·42	45·17
Shahjehanpore	295	·34	10·17	5·42	6·78	. .	. .	1·02	1·02	...	1·02		25·76	51·53
Bareilly	1,893	·42	31·12	6·97	14·42	.	·05	·95	...	...	·21	. .	44·06	98·10
Budaon	394	...	12·69	4·31	7·11	.		1·27	.	.	·51		12·94	38·83
Seharunpore	203	.	117·73	...	10·34		3·45	2·96			.	. .	32·02	166·50
Bijnore	198	..	31·31	1·01	8·08	.	. .	5·56	·50		.		39·90	86·36
Deyrah	57	...	35·09	. .	3·51		. .	.	...		3·51	. .	10·52	52·63
Almorah	132	...	50·00		25·76	·76	2·27	15·15	.			·76	84·85	179·55
Mozuffernuggur	136	. .	35·29		14·70		·74	...	...	·74			13·97	65·44
Moradabad	363	·55	17·63	..	12·40	. .	·28	1·65	·28	.	·28	.	17·90	50·97
Meerut, Central	1,257	...	17·50	·08	11·61	·08	...	2·15	·16	. .	·87	·16	11·38	43·99
„ District	371	..	54·72	..	7·55			1·08	.		·54		15·63	79·52
	8,992	·32	25·84	2·12	12·38	·13	·27	3·21	·27	·03	·33	·31	25·38	70·69
Delhi	348	..	122·70	..	14·08	.	·29	·57	·57	. .	·29	.	12·65	151·15
Rhotuck	214	...	4·67	..	1·87	. .			. .	·93	.	...	5·14	12·61
Hissar	260	.	39·23	4·62	6·15	.	.	3·85	·38		·38		12·69	67·30
Sirsa	315	·32	81·59		2·54	. .				. .	. .		23·17	107·62
Kurnaul	145	.	137·93	2·07	13·10	.	1·38	8·28	·69	. .	·69	.	34·48	198·62
Umballa	669	...	54·11	.	4·48	.	·75	·15	. .	·15	·15	...	14·35	74·44
„ Jhugger Gang	312	..	76·28		10·26	...	·96	1·28	...	.	·64	...	19·55	108·97
Loodianah	225	.	117·33	31·11	11·11	.	·44	3·56	...	1·34	·44	...	32·80	198·22
Jullundur	397	...	13·85	·25	3·53		.	·25	...	...	·25	...	20·41	38·54
Ferozepore	428	...	38·79	...	3·74	.	...	·47	·23	. .	·47	. .	12·61	66·31
Umritsur	583	1·20	62·44	·69	9·05		..	1·37	.	. .	...	.	8·02	84·67
Lahore, Central	2,080	..	101·63	1·68	6·80	...	·43	2·58	·10	.	...	.	22·78	136·00
„ Female Jail	145	1·38	185·52	16·55	24·83	·69	2·76	·69	1·38	·69	2·76	...	42·75	280·00
Sealkote	374	...	32·35	...	5·88	.	...	1·60	...	·27	·54	. .	45·72	86·36
Dhurmsalla	123	. .	58·54	...	32·52	. .	. .	·81	...	...	...		14·63	106·50
Goordaspore	321	.	75·08	...	8·10		·93	1·87	...	...	·62	...	11·96	101·58
Goojranwalla	496	.	20·36	·81	14·11	. .	·61	2·42	·20	·40	·40	. .	12·70	52·01
Goojrat	314	...	24·20	·32	6·05	...	·32	·96	·32	...	·32	. .	7·90	40·45
Shahpore	367	...	16·35	·27	4·63	.	.	·82	. .	.	...	...	10·90	32·97
Jhelum	358	...	67·32	6·70	10·89	. .	. .	1·96	·28	...	...	...	10·61	97·76
Montgomery	527	. .	48·57	..	2·85	.	·38	2·85	...	...	·38	...	5·88	60·91
Mooltan	751		35·02	·40	16·98	. .	·13	2·07	·13	.	·40	·13	12·65	67·51
Jhung	344	...	29·36	...	5·81	·29	·29	·58	...	. .	...	...	7·85	44·18
Dera Ghazee Khan	368	..	97·01	...	11·41	. .	1·09	4·35	·27	·27	4·62	·27	123·91	243·20
Dera Ismail Khan	327	. .	73·70	...	4·28	·31	·31	3·67	...	...	·31	. .	40·97	123·55
Kohat	144	1·39	76·39	·69	11·81	.	...	9·72	...	...	·69	...	62·50	163·19
Bunnoo	83	...	128·92	1·20	15·66	...	...	...	...	...	1·20	3·62	81·93	232·53
Rawulpindee	943	..	89·93	105·73	14·32	...	1·48	2·44	·32	...	2·65	·53	31·07	248·47
Peshawur	411	7·54	108·76	1·22	27·01	·24	1·22	5·11	.	. .	·97	8·76	48·66	209·49
	12,381	·35	68·48	9·58	9·14	·03	·48	2·15	·14	·09	·61	·37	23·94	115·06
BENGAL PRESIDENCY	61,998	1·17	43·63	3·23	18·69	·11	·64	3·05	·46	·23	1·04	·43	28·73	101·91

JAILS OF THE BENGAL PRESIDENCY, 1869.

X.

TABLE showing the PREVALENCE of CHOLERA in each MONTH and the DISTRIBUTION of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the Year.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions of the Year.	Admitted per cent. of Average Strength.	Total Deaths of the year.	Died per 1,000 of Average Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Allipore	2,450	...	11	22	28	2	18	5	4	5	1	3	5	104	..	33	..
Barasset	204	...	...	1	...	..	...	...	...	...	...	...	..	1	...	...	...
Jessore	726	...	...	...	...	...	...	..	..	...	...	...	...	...	...	...	...
Kishnaghur	415	..	...	2	...	...	...	...	..	...	...	..	...	2	...	...	...
Moorshedabad	186	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	..
Howrah	133	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	..
Hooghly	526	4	...	...	3	2	...	...	...	...	1	...	...	10	...	4	...
Serampore	42	1	..	...	...	1	...	..	...	...	...	...	...	2	...	1	...
Burdwan	311	.	...	...	...	...	...	...	...	..	..	...	...	...	...	...	...
Bancoorah	422	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	..
Purulea	187	...	...	...	...	...	...	...	...	..	...		...	...	...	...	...
Raneegunge	36	...	..	...	...	...	7	...	...	...	...	...	...	7	...	4	...
Sooree	217	..	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...
Rajmehal and Pakour	101	.	...	...	...	...	..	...	.	...	..	...	...	...	...	...	...
Deoghur and Sub-Divisions	118	..	..	..	..	...	...	...	...	...	..	...	...	...	...	...	...
Malda	93	...	...	...	10	...	...	...	.	.	..	...	3	13	...	5	..
Dinagepore	408	..	.	...	...	2	.	...	...	...	..	..	...	2	...	1	...
Rajshahye	490	...	..	...	1	...	...	...	...	..	.	..	...	1	...	...	...
Rungpore	391	..	...	...	2	51	...	..	...	...	.	..	...	53	...	20	...
Bograh	158	.	...	...	1	4	...	..	...	.	..	...	...	5	...	4	...
Mymensingh	527	...	...	1	...	1	...	..	1	...	...	..	...	3	...	1	...
Pubna	180	2	...	1	...	...	...	..	...	...	...	...	..	3	...	2	...
Furreedpore	342	...	..	...	...	...	...	...	..	...	...	...	...	...	...	...	...
Backergunge	527	...	...	6	6	...	2	...	.	2	..	16	..	32	...	19	...
Noacolly	249	...	..	...	..	...	...	...	...	...	...	...	...	...	...	...	...
Chittagong	244	1	..	1	..	...	...	...	...	...	...	...	...	2	...	2	...
Tipperah	346	..	...	...	2	...	...	...	...	...	...	...	...	2	...	1	...
Dacca	408	...	2	1	...	1	..	...	1	..	...	...	2	7	...	1	...
Sylhet	385	...	...	..	1	13	...	..	...	...	..	...	.	14	...	4	...
Shillong	58	.	.	...	...	...	..	11	.	1	..	.	...	12	.	11	...
Cachar	124	...	...	...	...	...	...	...	...	..	...	..	...	...	...	...	.
Gowalparah	98	...	...	...	...	..	7	...	...	...	...	...	...	7	...	3	...
Gowhatty	198	...	...	...	1	...	.	2	..	...	...	...	...	3	...	2	...
Seebsaugor	118	...	...	...	...	...	...	...	...	...	...	...	...	...		...	..
Nowgong	61	...	..	...	5	7	...	..	...	...	...	...	...	12	...	4	...
Tezpore	182	1	...	...	2	1	...	1	..	..	...	..	...	5	...	4	...
Debrooghur	86	..	...	...	...	...	...	2	1	...	...	...	...	3	...	2	...
Midnapore	723	..	...	12	...	...	...	1	...	...	...	...	...	13	...	4	...
Balasore	160	1	...	2	..	...	...	1	.	...	.	...	...	4	...	1	...
Cuttack	327	..	...	...	...	...	...	...	1	...	...	..	...	1	...	1	...
Pooree	130	...	..	...	...	...	2	3	...	..	..	..	...	5	..	4	...
Sumbulpore	97	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...
Chyebassa	104	...	..	...	...	...	.	..	...	...	...	..	...	...	...	...	...
Ranchee	312	...	..	1	...	...	...	3	2	..	...	...	...	6	...	4	..
Hazareebaugh, Central	706	...	...	...	3	...	...	...	1	...	1	...	...	5	...	1	...
„ District	277	...	...	...	...	..	...	1	...	...	...	...	...	1	...	...	...
Monghyr	356	...	...	...	.	...	.	...	...	...	..	...	...	...	...	...	..
Bhaugulpore	299	..	...	...	...	..	...	...	...	...	...	1	7	8	...	5	...
Purneah	310	...	...	...	1	...	...	1	.	...	...	...	...	2	...	1	..
Darjeeling	52	...	...	...	...	...	...	..	...	...	..	...	...	...	...	...	..
	15,058	10	13	60	68	85	36	31	11	8	3	20	17	350	2·24	140	9·52
Gyah	490	...	...	...	...	1	...	...	6	...	...	...	...	7	...	3	...
Patna	438	..	...	2	14	...	...	...	...	18	4	20	...	58	...	15	...
Deegah	776	...	...	1	2	...	...	1	...	...	...	1	1	6	...	...	...
Arrah	398	.	..	...	...	1	1	16	..	...	..	...	...	18	..	6	...
Chumparun	260	..	...	...	...	...	...	24	10	...	...	...	...	34	...	15	...
Mozufferpore	810	..	...	...	...	1	5	7	2	...	...	..	...	15	...	6	...
Chuprah	269	...	...	...	...	...	3	51	2	...	...	...	...	56	...	18	...
Ghazeepore	552	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Benares, Central	1,157	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ District	644	...	...	...	...	...	...	...	2	...	...	...	...	2	...	2	...
Mirzapore	271	...	...	...	...	...	...	2	1	...	..	...	...	3	...	...	...
Azimghur	446	...	...	...	...	...	...	...	...	...	14	...	...	14	...	8	...
Jounpore	317	...	...	...	...	...	...	...	6	...	...	...	...	6	...	2	...
Goruckpore	706	..	...	...	...	...	...	64	10	...	...	...	...	74	...	84	...
Bustee	130	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gonda	654	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Baraich	176	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...
Fyzabad	1,180	..	...	...	...	...	...	...	3	...	...	...	...	3	..	1	...
Sultanpore	472	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rae Bareilly	322	...	...	...	...	2	...	5	...	...	...	...	...	7	...	3	...
Pertabghur	181	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hurdui	314	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kheree	238	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lucknow, Central	1,715	...	...	...	...	...	...	...	...	2	...	...	...	2	...	2	...
„ District	1,110	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Seetapore	1,008	...	...	...	1	3	...	...	...	...	...	...	...	4	...	1	...
Nawabgunge	105	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Oonao	243	...	...	...	...	...	...	...	6	...	...	...	...	6	...	1	...
Etah	212	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Humeerpore	192	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Oraie	174	...	...	...	...	...	2	...	...	...	...	...	...	2	...	2	...
Futtehghur, Central	821	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ District	402	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cawnpore	412	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Futtehpore	271	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

STATIONS.	Average Strength for the Year.	Number of Admissions into Hospital in each Month.												Total Admissions of the Year.	Admitted per cent. of Average Strength.	Total Deaths of the year.	Died per 1,000 of Average Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Banda	414	...	...	...	...	...	1	...	...	...	...	...	...	1	...	1	...
Allahabad, Central	1,833	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
" District	548	...	...	...	...	...	...	8	11	...	...	...	...	19	...	7	...
Nagode	116	...	...	...	...	...	...	1	2	...	...	...	...	3	...	2	...
	20,172	...	...	3	17	9	12	170	61	20	18	21	1	341	1·69	129	6·40
Raepore	414	...	...	...	...	...	1	...	...	...	...	...	...	1	...	1	...
Belaspore	88	...	...	...	2	...	...	2	...	...	...	...	...	4	...	3	...
Bandhara	132	...	...	...	...	...	...	22	2	...	...	...	1	25	...	12	...
Chanda	140	...	...	...	...	...	...	24	4	...	...	...	...	28	...	13	...
Nagpore	820	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...
Chindwarra	85	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Wurdah	45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sironcha	14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mundla	70	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jubbulpore	851	...	...	...	...	1	1	12	2	...	2	...	...	18	...	13	...
Dumoh	108	...	...	...	...	2	...	...	...	...	...	...	...	2	...	1	...
Saugor	242	...	...	...	...	...	9	...	...	...	...	...	...	9	...	3	...
Nursingpore	142	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lullutpore	208	...	...	...	1	...	6	...	6	...	...	...	...	13	...	7	...
Jhansi	264	...	...	...	...	...	...	...	2	...	...	...	...	2	...	2	...
Seonee	123	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Baitool	73	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sehore	80	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hoshungabad	299	...	...	...	...	1	...	...	...	...	...	...	...	1	...	1	...
Nimar	79	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ajmere	398	...	...	...	...	2	...	...	7	2	...	...	...	11	...	3	...
Beaur	111	...	...	...	...	32	2	1	...	...	...	...	...	35	...	9	...
	4,795	...	1	...	3	38	19	61	23	2	2	...	1	150	3·13	68	14·18
Muttra	223	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Agra, Central	1,839	...	...	...	...	...	...	5	4	2	...	...	...	11	...	4	...
" District	407	...	...	...	...	...	...	...	6	...	...	...	...	6	...	5	...
Etawah	233	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mynpoorie	305	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1	...
Allyghur	381	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bolundshuhur	155	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Shahjehanpore	295	...	...	...	...	...	...	1	...	...	...	...	...	1	...	1	...
Bareilly	1,893	...	...	...	...	...	...	...	8	...	...	...	...	8	...	6	...
Budaon	304	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Seharunpore	203	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bijnore	198	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Deyrah	57	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Almorah	132	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mozuffernuggur	136	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Moradabad	363	...	...	...	2	...	...	...	...	...	...	...	...	2	...	2	...
Meerut, Central	1,257	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
" District	371	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	8,902	...	...	...	2	...	...	6	18	2	...	...	1	29	·32	19	2·11
Delhi	348	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rhotuck	214	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hissar	260	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sirsa	315	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...
Kurnaul	145	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Umballa	669	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
" Jhugger Gang ..	812	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Loodianah	225	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jullundur	397	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ferozepore	428	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Umritsur	583	...	...	...	...	...	...	...	7	...	...	...	...	7	...	6	...
Lahore, Central	2,080	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
" Female Jail ...	145	...	...	...	...	...	...	...	2	...	...	...	...	2	...	2	...
Sealkote	874	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dhurmsalla	123	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Goordaspore	321	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Goojranwalla	496	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Goojrat	314	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Shahpore ...	367	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jhelum ...	358	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Montgomery	527	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mooltan	751	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jhung	344	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dera Ghazee Khan	308	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dera Ismail Khan	327	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kohat	144	...	...	...	...	...	...	...	...	1	...	1	...	2	...	1	...
Bunnoo	83	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rawulpindee	943	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Peshawur	411	...	...	...	...	...	...	...	...	24	3	4	...	31	...	13	...
	12,381	...	...	...	...	...	...	...	9	25	4	5	...	43	·35	22	1·78
BENGAL PRESIDENCY ...	61,998	10	14	53	66	132	67	277	122	57	27	46	20	913	1·47	387	6·24

JAILS OF THE BENGAL PRESIDENCY, 1869.

XI.

TABLE showing the MORTALITY in each JAIL, the CAUSES of DEATHS, and the RATIO of DEATHS to STRENGTH.

STATIONS.	Average Strength for the Year.	Causes of Deaths. Cholera.	Smallpox.	Fevers.	Apoplexy.	Dysentery and Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Number of Deaths.	Died per 1,000 of Average Strength. A. Cholera.	B. All other Causes.	C. All Causes.
Alipore	2,460	33	...	4	2	55			13	2	28			13	2	13	165	13·47	53·88	67·35
Barasut	204	...				10		1	4		3				...	2	20*	...	98·04	98·04
Jessore	726		...	3		4			6	1	1	1					16	...	22·04	22·04
Kishnaghur	415	...		3	...				1	1				2		1	8	...	19·28	19·28
Moorshedabad	186			4		6			...		1	...			...	...	11	..	59·14	59·14
Howrah	133	...	...	1		2							...			...	3	...	22·56	22·56
Hooghly	526	4		3		11		1		...	2	1				...	22	7·60	34·23	41·83
Serampore	42	1									...	...					1	23·81	..	23·81
Burdwan	311			2		2		1			...	...					5	..	16·08	16·08
Bancoorah	422			1					1		1	...					3	...	7·11	7·11
Purulea	187	...		...	...	3				...	...				...	1	4		21·39	21·39
Raneegunge	36	4									1		...				5	...		...
Sooree	217					4			1		3	...		1			9		41·47	41·47
Rajmehal and Pakour	101			2	...	1											3	..	29·70	29·70
Deoghur and Sub-Divisions	118		...		1										...		1	...	8·47	8·47
Malda	93	5				2			...					1	...		8	53·76	32·26	86·02
Dinagepore	408	1	1	1		10			6		2	4		5	1	1	32	2·45	75·98	78·43
Rajshahye	490			2		9			1	1	2	2		2		1	20		40·80	40·80
Rungpore	391	20		1		28					1			13		1	64	51·15	112·53	163·68
Bograh	158	4				5					1			4		1	15	25·32	69·62	94·94
Mymensingh	627	1		5		12			2		5	1				2	28	1·60	51·23	53·13
Pubna	180	2				1										1	4	11·11	11·11	22·22
Furreedpore	312	...		2		2		1			2	2		1			10		20·24	20·24
Backergunge	527	10		6		28			4	1	1	2		1			62	30·05	81·60	117·65
Noacolly	240	...		1		1		1	1								4		16·66	16·66
Chittagong	244	2		...		3			1			1		1			8	8·20	24·59	32·79
Tipperah	346	1		2		1			1							3	8	2·89	20·23	23·12
Dacca	468	1		3	1	1	1		1		4					3	15	2·14	29·91	32·05
Sylhet	385	4		4		5			1			1					15	10·39	28·57	38·96
Shillong	58	11				2											13	189·66	34·48	224·14
Cachar	124					3											3		24·19	24·19
Gowalparah	98	3		1		1			1		1	1		2			10	30·61	71·43	102·04
Gowhatty	196	2			1	17			1		1	2				1	25	10·20	117·35	127·55
Seebsaugor	118					2								1			3	..	25·42	25·42
Nowgong	61	4															4	65·57		65·57
Tezpore	182	4		2		1					1						8	21·98	21·98	43·96
Debrooghur	86	2				1			1	1							5	23·26	34·88	58·14
Midnapore	723	4		3		4			1		5					3	20	5·53	22·13	27·66
Balasore	160	1				1											2	6·25	6·25	12·50
Cuttack	327	1		2		2			1			2		2		2	12	3·06	33·64	36·70
Pooree	130	4				4			2		2	1					13	30·77	69·23	100·00
Sumbulpore	97			1		6						1					8	...	82·47	82·47
Chyebassa	104			2		2											4		38·46	38·46
Ranchee	312	4		3		8			1					1		1	18	12·82	44·87	57·69
Hazareebaugh, Central	706	1		2		5	2		3					2			15	1·42	19·83	21·25
" District	277			1		2			3					1		1	8	..	28·88	28·88
Monghyr	356					8			1		1	1		2		1	14	...	39·33	39·33
Bhaugulpore	299	5		1	1	9					2			2		2	22	16·72	56·86	73·58
Purneah	310	1		2		1		1				2				1	8	3·22	22·59	25·81
Darjeeling	52	...							...	...		1				...	1	..	19·23	19·23
	15,058	110	1	70	6	285	3	6	59	7	71	26		57	3	42	785	9·52	40·62	50·14
Gyah	490	3		3	2	36	1	1	4	1	2			7	2	8	70	6·12	136·74	142·86
Patna	438	15		1		17			5		2		1	1	1	1	44	34·25	66·21	100·46
Deegah	776			2		17			1		4	2		2		5	33		42·53	42·53
Arrah	398	6		1		2			3								12	15·08	15·08	30·15
Chumparun	260	15	...	2		8						1					26	57·69	42·31	100·00
Mozufferpore	310	6	...	1		11		1	3					1	1		24	19·36	58·06	77·42
Chuprah	269	18		1		4									1	1	25	66·91	26·03	92·94
Ghazeepore	552				1	5		1						3	1	1	12	...	21·74	21·74
Benares, Central	1,157		3	8	1	12	1	1	1		3					1	31	...	26·79	26·79
" District	544	2		1	2	13					3					2	23	3·68	38·60	42·28
Mirzapore	271			1	4	4			1		1						11		40·59	40·59
Azimghur	446	8		2	2	20						1					33	17·94	56·05	73·99
Jounpore	317	2		3		4								2			11	6·31	28·39	34·70
Goruckpore	706	34		5		56	1	1	8					10		2	117	48·16	117·56	165·72
Bustee	130					1			1								2		15·38	15·38
Gonda	654			9		3			4		2	...		1		1	14	..	21·41	21·41
Baraich	176		...												...	...	None		...	...
Fyzabad	1,180	1		4		33			1		2					2	43	·85	35·59	36·44
Sultanpore	472			6	1	1									1		9	..	19·07	19·07
Rae Bareilly	322	3		1		2	1									2	9	9·32	18·63	27·95
Pertabghur	181				2	2										1	5	...	27·62	27·62
Hurdui	314					3									...		3	...	9·56	9·56
Kheree	238		...		1	1						1				1	4	...	16·81	16·81
Lucknow, Central	1,715	2	1		1	9			3		10			1	1	5	33	1·17	18·07	19·24
" District	1,110				2	7		1	3	1	1					3	18		16·22	16·22
Seetapore	1,008	1		3	2	3			1		...			2		3	15	·99	13·89	14·88
Nawabgunge	105			...					...	...	...						None	..		...
Oonao	243	1			1	2					...						4	4·11	12·35	16·46
Etah	212							...	1	...	...	...	...		...		1	..	4·72	4·72
Humeerpore	192				6	7		1			1			6	1	2	24	..	125·00	125·00
Oraie	174	2			1	4					1	1	...				9	11·49	40·23	51·72
Futtehghur, Central	821			1	1	5			2	1	...			1	...	2	13	...	15·83	15·83
" District	402	...			1	4			1		1					1	8	...	19·90	19·90
Cawnpore	412	...			1	7		...	3	...	...				...	1	12	...	29·12	29·12
Futtehpore	271				2	6			1		1				...	...	10	...	36·90	36·90

* Chiefly prisoners from Alipore sent for change.

STATIONS.	Average Strength for the Year.	Causes of Deaths. Cholera.	Smallpox.	Fevers.	Apoplexy.	Dysentery and Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Number of Deaths.	Died per 1,000 of Average Strength. A. Cholera.	B. All other Causes.	C. All Causes.
Banda ...	414	1	...	1	7	22	...	1	3					1			36	2·42	84·54	86·96
Allahabad, Central ...	1,833			5	7	23	...	1	7		5	...		1	5	3	57	..	31·10	31·10
„ District ...	543	7	1	3	3	7		...			1			3	...	1	26	12·89	34·99	47·88
Nagode ...	116	2		3	...	5			2		...						12	17·24	86·21	103·45
	20,172	129	5	61	51	306	4	9	59	3	10	6	1	12	14	49	839	6·40	35·19	41·59
Raepore ...	414	1		2		11			...			1		1	1		17	2·42	38·64	41·06
Belaspore	88	3				6	...	...						2		1	12	34·09	102·27	136·36
Bandhara	132	12		2	2	5	...							1		1	23	90·91	83·33	174·24
Chanda ...	149	13				3								2			18	87·25	33·56	120·81
Nagpore ...	820			2	1	16	...	...	4					2		1	26	...	31·71	31·71
Chindwarra	85					1		...							...	1	2	...	23·53	23·53
Wurdah ...	45							...									None	...	...	
Sironcha ...	14						...	...								...	None	...		
Mundla ..	70					4											4	...	57·14	57·14
Jubbulpore	851	13		1	1	53			9		2	1		6		4	90	15·28	90·48	105·76
Dumoh ...	108	1				2	1									3	7	9·26	55·55	64·81
Saugor ...	242	3				5	...		1		1					1	11	12·40	33·05	45·45
Nursingpore	142			2		3								1		...	6	..	42·25	42·25
Lullutpore	208	7		2		12		1	4		2			1		1	30	33·65	110·58	144·23
Jhansi ...	264	2		3	3	8		1				1		1	1	3	23	7·57	79·55	87·12
Seonee ...	123		...	1		6			1								8	...	65·04	65·04
Baitool ...	73	...		1		1								1			3	...	41·10	41·10
Sehore ..	80			1		2			1								4	...	50·00	50·00
Hoshungabad	299	1		4		2			1					2	1	1	12	3·34	36·79	40·13
Nimar ...	79								...			1				...	1	..	12·66	12·66
Ajmere ...	398	3		12		11	1		2					1		...	33*	7·54	75·37	82·91
Behar ...	111	9	1	1		8						2		4	1	...	26*	81·08	153·15	234·23
	4,795	68	1	34	7	162	2	2	23		5	6		25	4	17	356	14·18	60·06	74·24
Muttra ...	223				1											1	2	..	8·98	8·98
Agra, Central	1,830	4				11	...	1	10		4		1			6	37	2·12	18·00	20·12
„ District	497	5			3	8			8							1	25	10·06	40·24	50·30
Etawah ...	233																None		...	
Mynpoorie	365	1	1			2			1		1				1	1	8	2·74	19·18	21·92
Allyghur ..	381			1	1					1		1					4	...	10·50	10·50
Bolundshuhur	155				1									1		1	3	...	19·35	19·35
Shahjehanpore	295	1		1	2	1		...	1		2						8	3·39	23·73	27·12
Bareilly ...	1,893	6		20	3	12			2		1			2		4	50	3·17	23·24	26·41
Budaon ...	394	...		4		3			1						1	1	10	...	25·38	25·38
Seharunpore	203			5		1		...	5						1	...	12	...	59·11	59·11
Bijnore ...	198					1										1	2	...	10·10	10·10
Deyrah ...	57	...												2		...	2	...	35·09	35·09
Almorah ...	132			...		5			1								6	...	45·45	45·45
Mozuffernuggur	136	...		3		3		1		1		1	...			...	9	..	66·18	66·18
Moradabad	363	2				3			1				...	1			7	5·51	13·77	19·28
Meerut, Central	1,257	...		3	3	41			11		1			2		2	66	...	52·51	52·51
„ District	371			1		6			2					1			10	...	26·95	26·95
	8,992	19	1	38	11	100	..	2	43	2	9	2	1	9	3	18	261	2·11	26·92	29·03
Delhi ...	348	...	..	5		2			1		1					2	11	...	31·61	31·61
Rhotuck ..	214				2	1						1			1		5	...	23·37	23·37
Hissar ...	260	...		4		3			...		1					2	10	...	38·46	38·46
Sirsa ...	315			2													2	...	6·35	6·35
Kurnaul ...	145			2		1	...		1					1		1	6	...	41·38	41·38
Umballa ..	669	...	...	1	1	3			1					1		3	10	...	14·95	14·95
„ Jhugger Gang	312				2	4			2					1		1	10	...	32·05	32·05
Loodianah ...	225			3	...												3	...	13·33	13·33
Jullundur ...	397	...		1	1	2										3	7	...	17·63	17·63
Ferozepore	428					1			1					1			3	..	7·01	7·01
Umritsur ...	583	6		8	1	8	...		5		1				1	1	31	10·29	42·88	53·17
Lahore, Central ...	2,089	...		33		10			11		1					2	57		27·29	27·29
„ Female Jail.	145	2				11	1		1		1	1				1	18	13·79	110·35	124·14
Sealkote ...	374					1						1					2	...	5·35	5·35
Dhurmsalla ...	123	...				6											6	...	48·78	48·78
Goordaspore ..	321	...		2		5			2								9	...	28·04	28·04
Goojranwalla ...	496			3	1	3	1		1		2	2				3	16	...	32·26	32·26
Goojrat ...	314	...				1			1								2	...	6·37	6·37
Shahpore ...	367			1		1											2	...	5·45	5·45
Jhelum ...	358			6		1										2	9	...	25·14	25·14
Montgomery	527	...		5				1	2					1		1	10	..	18·98	18·98
Mooltan...	751	...		4		5			4							1	14	...	18·64	18·64
Jhung ...	344	...				2	1	1		1							5	...	14·54	14·54
Dera Ghazee Khan ..	368			3					1			1			...	3	8	...	21·74	21·74
Dera Ismail Khan ..	327								2		1					...	3	...	9·18	9·18
Kohat ...	144	1						...	9		...						10	6·94	62·50	69·44
Bunnoo ..	83				1	2											3	..	36·15	36·15
Rawulpindee	943			94†	1	12			2		2			1	2	2	116†		123·01	123·01
Peshawur...	411	13		3		7			1					1			25	31·63	29·20	60·83
	12,381	22	..	180	10	92	3	2	48	1	10	6		7	1	28	413	1·78	31·58	33·36
Bengal Presidency	61,998	387	8	383	88	1,005	12	21	232	13	135	46	2	140	28	164	2,654	6·24	36·57	42·81

* Famine Population. † Jail Fever

JAILS OF THE BENGAL PRESIDENCY, 1869.

XII.

DETAIL of the ADMISSIONS and DEATHS of the JAIL POPULATION of each PROVINCE.

(A Summary of the Annual Returns of the Jails of the Presidency.)

CAUSES OF ADMISSIONS AND DEATHS.	BENGAL PROPER AND ASSAM. Strength ... 16,658 Admissions ... 19,371	BEHAR PROVINCES, BENARES, OUDH, AND CAWNPORE. Strength .. 20,172 Admissions .. 14,732	NAGPORE AND CENTRAL INDIA. Strength ... 4,795 Admissions ... 8,359	AGRA, MEERUT, AND ROHILCUND. Strength ... 8,992 Admissions ... 6,344	PUNJAB. Strength ... 12,381 Admissions ... 14,338
	Admitted.	Admitted.	Admitted.	Admitted.	Admitted.
Variola	17	104	6	4	11
Varicella et Varioloides ...	461	18	0	..	3
Morbilli	139	...	5	5	...
Tonsillitis	9	11	6	8	7
Parotitis	51	17	22	41	8
Febris, Intermittens ..	8,002	4,573	3,513	2,358	8,878
„ Remittens et Continua ..	213	322	172	103	810
Ophthalmia	119	273	113	104	217
Erysipelas	12	11	3	7	6
Erythema	1	..	...	...	3
Anthrax	19	11	3	10	10
Furunculus	17	20	38	5	11
Gangræna	10	1	..	2	2
Pyæmia	1	..			..
Influenza	2	1	2	...	2
Dysenteria	2,157	2,150	1,146	501	598
Diarrhœa ...	1,855	1,518	585	613	587
Cholera	350	341	148	30	48
Rheumatismus ...	401	251	200	97	143
Syphilis Primaria ..	117	179	70	61	91
„ Secundaria	103	92	13	43	30
Iritis Syphilitica	..		4	...	...
Gonorrhœa	63	35	10	2	22
Bubo	15	37	13	3	22
Orchitis	13	9	8	4	12
Phymosis	28	27	10	1	2
Condyloma	6	1	...		4
Lepra	32	32	15	5	5
Elephantiasis	31		...	...	...
Scorbutus et Purpura ...	174	11	9	28	46
Bronchocele	4	...	..	...	1
Aphtha	7	1	...	..	..
Porrigo	3	4	1	8	6
Scabies	230	181	74	38	115
Vermes	6	4	3	2	4
„ Tænia	4	3	3	2	6
„ Dracunculus ...	..	4	35	25	105
Anæmia	48	50	13	...	38
Anasarca ...	63	23	13	2	9
Scirrhoma	2	1	...	..	1
Scrofula ..	9	12	1	13	4
Phthisis Pulmonalis	114	78	6	20	14
Tuberculosis (seat not specified) ..	7	..	..	...	...
Hæmoptysis	35	18	3	2	6
Abscessus Psoanus ...			...	...	...
Meningitis	1	...		...	1
Encephalitis	...	1	1	4	...
Apoplexia et Insolatio ..	6	205	13	62	25
Paralysis	13	12	1	7	3
Tetanus	1	1	..	1	3
Epilepsia	22	52	8	4	15
Chorea		...	...	...	5
Hysteria	1	1	1	...	...
Delirium Tremens ..	..		...	1	...
Mania	51	55	11	25	13
Melancholia	4	..	...	...	...
Dementia	14	3	3	2	...
Cephalæa	13	19	12	6	8
Neuralgia ...	34	14	7	3	10
Odontalgia	15	7	8	3	2
Otitis	31	31	24	19	18
Cæcitas	2	2	...	1	...
Pericarditis	3	2	...	...	1
Morbus Cordis... ...	7	4	...	3	1
Aneurisma	2	...	1	1	1
Angina Pectoris	...	...	...	1	...
Palpitatio	...	...	1	...	...
Syncope ...	1	1	1	1	1
Hæmorrhage (into abdominal cavity)	1	...	...	...	...
Epistaxis	5	6	3	3	2
Varix	...	..	...	...	1
Laryngitis	3	3	...	1	4
Bronchitis	286	282	126	102	127
Pleuritis	49	28	49	69	45
Pneumonia	199	66	51	76	67
Gangræna Pulmonum	...	..	...	...	...
Asthma	58	67	25	31	14
Ozæna	...	6	...	2	...
Stomatitis	10	3	3	1	...
Gastritis	11	1	3	1	...
Enteritis	3	7	1	3	4
Peritonitis	4	3	2	1	...
Ileus	2	2	...	1	1
Hernia	8	5	2	1	5
Obstipatio	147	70	47	7	24
Dyspepsia	699	130	98	72	159
Colica	193	157	111	75	186
Hæmatemesis	4	8	...	1	2

CAUSES OF ADMISSIONS AND DEATHS.	Bengal Proper and Assam.		Behar Provinces, Benares, Oude, and Cawnpore.		Nagpore and Central India.		Agra, Meerut, and Rohilcund.		Punjab.	
	Admitted.	D[illegible]	Admitted.	[illegible]	Admitted.	[illegible]	Admitted.	[illegible]	Admitted.	[illegible]
Melæna	2		2						1	
Hæmorrhois	60		44		12		10		46	
Fistula in Ano	16		5		1		1		4	
Splenitis	192		95		23		24		60	
Hepatitis	36		17		1		11		4	
Cirrhosis	1		1						..	
Icterus	60		24		5		33		11	
Ascites	22		7		2		1		3	
Nephritis	5		3		1		9		6	
Hæmaturia	5		4		6		...			
Ischuria	..		3		3		1		..	
Diuresis et Diabetes .. .	10		1		3				2	
Enuresis			1		2					
Cystitis	3		..		1		1			
Lithiasis	1		..						4	
Calculus	1		4				2		1	
Fistula in Perineo ...	1		1		1					
Strictura Urethræ ...	9		5		2		6		2	
Orchitis	24		13		8		10		2	
Hydrocele	40		9		3		1		2	
Leucorrhœa	2		1		1		..			
Menorrhagia	5		9		1				1	
Hysteritis	2		..							
Partus	4		18		15		3		26	
Abortus	8		1		2				3	1
Synovitis . ..	14		3		1		5		1	
Periostitis	5		19						1	
Caries	..		3				1		6	
Necrosis			4		1				2	
Contractura	1									
Urticaria	9		12		10		5		3	
Eczema	13		4		1		8		8	
Herpes	25		33		2		80		8	
Prurigo	4		3							
Impetigo	...		...		1		2		1	
Ecthyma	1		2							
Rupia	1		11				..		..	
Psoriasis	15		9		10		1		18	
Skin diseases not specified .	13								3	
Phlegmon and Abscess	495		1,334		432		618		551	
Whitlow	39		58		35		26		60	
Ulcer	367		459		520		356		102	
Tumour	7		14				5		2	
Atrophy and Debility	220		147		63		29		38	
Burning	31		34		12		11		11	
Dislocation	4		9		15		1		6	
Subluxation	9		4		7		2		4	
Fracture	27		116		19		65		31	
Contusion and Contused Wound ...	422		307		157		160		239	
Incised Wound	100		43		36		18		43	
Drowned	..									
Poisoning	4		1				1			
Suicide and Suicidal Wounds .	3		..		...					
Punished	22		67		20		6		31	
Cause not specified	...		.		..		...			

SUMMARY FOR 1869.

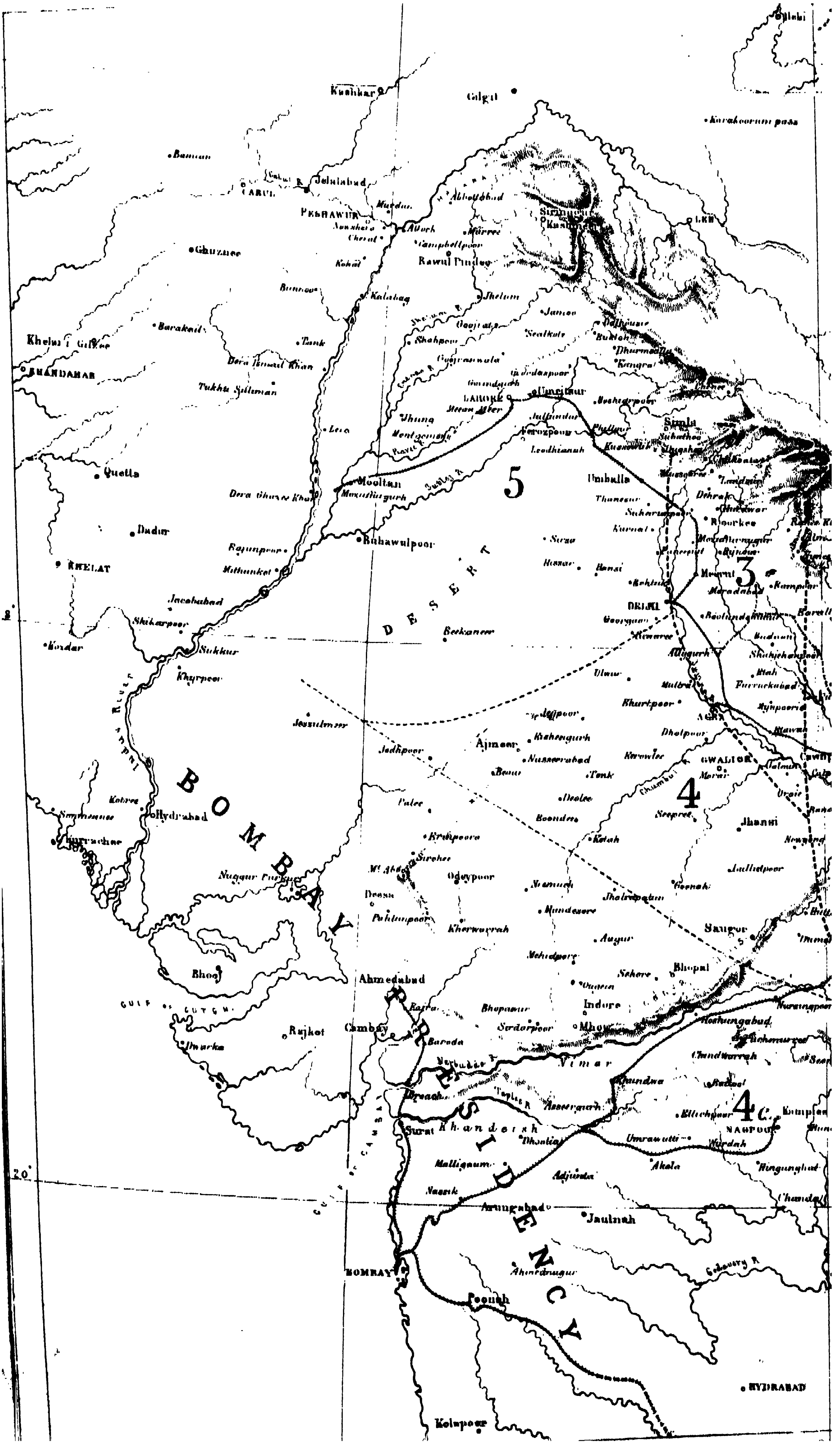
DETAIL of the ADMISSIONS and DEATHS of the EUROPEAN and NATIVE ARMIES and JAIL POPULATION of the BENGAL PRESIDENCY.

CAUSES OF ADMISSIONS AND DEATHS.	ADMITTED INTO HOSPITAL AND DIED IN AND OUT OF HOSPITAL,											
	EUROPEAN ARMY.		NATIVE TROOPS.								JAIL POPULATION.	
	Bengal Presidency.		Bengal Proper and Assam.		Upper Provinces.		Central India Force.		Punjab Frontier Force.		Bengal Presidency.	
	Average Strength 34,624 Admitted ... 59,206 [illegible]		Strength ... 7,462 Admitted ... 10,647 [illegible]		Strength ... 32,618 Admitted ... 48,777 [illegible]		Strength ... 4,010 Admitted... 5,813 [illegible]		Strength 10,217 Admitted 21,301 [illegible]		Average Strength 61,908 Admitted ... 63,038 [illegible]	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Variola ...	129	[illegible]	12		87	[illegible]	2		5		142	[illegible]
Varioloides et Varicella	2		7		33		1		3		488	
Morbilli	3	...	13		48		3		...		149	[illegible]
Scarlatina ...	3		...	...	..		...		...		...	
Tonsillitis	516		22		72		8		32		41	
Diphtheria ...	1		...		...		...		...		...	
Influenza	89		17		38		4		63		7	
Parotitis ...	10		42		80		7		25		139	
Febris Intermittens ...	16,806	[illegible]	4,155		20,113		3,091†		14,758	[illegible]	27,354	[illegible]
„ Remittens ...	2,149	[illegible]	90	[illegible]	372	[illegible]	21		77	[illegible]	1,710	[illegible]
„ Continua ...	6,927	[illegible]	13		156		1	[illegible]	29	[illegible]	...	
Ophthalmia	887		116		913		218		294		866	
Erythema ..	12		2		6		..		...		4	
Erysipelas	51	[illegible]	7		33		1		9		39	[illegible]
Furunculus	709		184		975		134		143		91	
Anthrax ..	11			..	10		3		6		53	
Gangræna			..		1		..		...		15	[illegible]
Pyæmia	2	[illegible]					..		...		1	[illegible]
Dysenteria	1,630	[illegible]	1,126		2,113		273		583	[illegible]	6,552	[illegible]
Diarrhœa ..	3,300	[illegible]	705	[illegible]	1,028		286		610		5,158	[illegible]
Cholera ..	876	[illegible]	66	[illegible]	260	[illegible]	60		107	[illegible]	912	[illegible]
Rheumatismus	1,706		436		1,353		171		350		1,182	
Syphilis Primaria	2,115		155		731		118		75		518	
„ Secundaria ..	797	[illegible]	54		234		20		40	[illegible]	285	
Gonorrhœa ..	3,062		66		371		99		46		135	
Bubo .	483		25		151		20		17		110	
Orchitis ..	160		3		61		...		6		46	
Phymosis	38		9		10		..		...		68	
Verruca ...	63		2		1		4		1		...	
Condyloma	15		..		5				1		11	
Lepra			1		9		1		...		80	
Elephantiasis ..			..		..		...		...		31	
Hydrophobia	1	[illegible]	1		..		1	[illegible]	...		...	
Scorbutus et Purpura	20		81	[illegible]	88		4		24		268	[illegible]
Ebriositas	9*						...		2		...	
Bronchocele ..	2		30		14				...		5	
Aphtha			1		1		...		1		8	
Porrigo	2				1		..		...		22	
Scabies ..	46		185		430		61		88		638	
Vermes ...	3		10		...		...		1		19	
„ Tænia	190		3		..		..		...		18	
„ Dracunculus	7		5		28		172		87		160	
Anæmia ...	290		32	[illegible]	128		..		69	[illegible]	149	[illegible]
Polysarcia	1				..		...		...		...	
Anasarca ...	18		6		9		2		...		110	[illegible]
Scirrhoma	3				3		...		...		4	
Podagra	8		..		5		2		..		...	
Scrofula et Tuberculosis ..	60		6		16		2		...		40	[illegible]
Phthisis Pulmonalis	382	[illegible]	13		51		4		14	[illegible]	232	[illegible]
Hæmoptysis	31		..		11		1		1		64	
Abscessus Psoanus	3	[illegible]	..		..		...		...			[illegible]
Morbus Coxæ	4		..		..		..		...			
Encephalitis ...	17				1		...				6	[illegible]
Meningitis	13		1		2	[illegible]			...		2	[illegible]
Myelitis ...	5				1		...		..		...	
Apoplexia et Insolatio ..	200	[illegible]	4		50		3	[illegible]	14	[illegible]	311	[illegible]
Paralysis	71	[illegible]	5		22	[illegible]	2		16		36	[illegible]
Tetanus ..							...				6	[illegible]
Epilepsia	119	[illegible]	1		14		4		3	[illegible]	101	[illegible]
Delirium Tremens ..	238		2		1		1		1		1	
Chorea ..	3		..		...		...		...		5	
Paralysis Agitans ...	8						...		...		...	
Hysteria			2		..				..		3	
Singultus ...			1				...		...		...	
Mania	42		12		23		1		4		155	[illegible]
Melancholia	18		3		..		...		..		4	...
Dementia	55		..		5		...		3		22	...
Hypochondriasis ..	3				...		...		...		...	...
Cephalæa .	4				4		...		...		58	..
Neuralgia	301		95		207		20		130		77	..
Odontalgia ..	2		3		26		5		12		35	...
Otitis	158		67		127		13		57		123	...
Dysecœa ..	57				37				3		...	
Cœcitas ..	31		14		21		6		11		5	
Pericarditis	20		..		4				...		6	[illegible]
Morbus Cordis	252		4	[illegible]	6		...		3		15	[illegible]
Angina Pectoris	3				..		...		...		1	[illegible]
Aneurisma	33	[illegible]			1		..		...		5	[illegible]
Rupture of Heart ..	..						...		1	[illegible]	..	..
Rupture of Aorta .	2				1	[illegible]	...		...		..	
Palpitatio .	147		..		8		.		...		1	
Syncope					1		...	...	...		5	
Varix	26	..	..	..	2	...	2		3		1	
Hæmorrhage (into abdominal cavity)				...	...		...	..	...		1	[illegible]
Epistaxis .	17		2				...		1		10	...
Phlebitis ..	3		...	..	1		...		...		...	..
Laryngitis ..	10		1		12				4		11	[illegible]
Bronchitis ..	1,351	[illegible]	252	[illegible]	595	[illegible]	32	[illegible]	147	[illegible]	923	[illegible]
Pleuritis ...	154		10		127	[illegible]	7		29	1	240	[illegible]

* See note to Table VIII, Native Troops.

† See note to Table XVI, European Troops.

CAUSES OF ADMISSIONS AND DEATHS.	ADMITTED INTO HOSPITAL AND DIED IN AND OUT OF HOSPITAL.											
	EUROPEAN ARMY.		NATIVE TROOPS.								JAIL POPULATION	
	Bengal Presidency.		Bengal Proper and Assam.		Upper Provinces.		Central India Force.		Punjab Frontier Force.		Bengal Presidency.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Pneumonia	112		23		151		11		69		459	
Asthma	15		21		59		6		20		105	
Gangræna Pulmonum	...						...					
Ozæna	6						...				8	
Stomatitis	45		16		38		5		14		17	
Stricture of Œsophagus	1						...				..	
Gastritis	16		2		5		4				16	
Enteritis	12				3		...				18	
Peritonitis	8		2		1		...				10	
Obstipatio	68		17		59		4		66		295	
Ileus	...		1		2		...				6	
Hernia	43		2		15		1		6		21	
Dyspepsia	1,507		146		208		61		73		1,158	
Colica	282		82		374		9		276		722	
Hæmatemesis	11		1		2				1		15	
Melæna	1				..						5	
Hæmorrhois	283		24		116		1		25		172	
Fistula in Ano	41		1		14		1		2		27	
Splenitis	138		149		275		7		86		394	
Hepatitis	1,809		22		13		12		35		69	
Cirrhosis	4				1				...		2	
Icterus	172		18		31		4		27		133	
Ascites	6		1		4		...		3		35	
Nephritis	60		2		19		1		11		24	
Hæmaturia	11		1		1		..				15	
Ischuria	4		2		3		1		1		7	
Enuresis	12								1		3	
Diabetes et Diuresis	5				1				..		16	
Cystitis	16		3		7		3		1		5	
Lithiasis			..		17		2		5		4	
Calculus					1		...		..		8	
Strictura Urethræ	138		1		15		1		6		27	
Extravasation of Urine	..										...	
Varicocele	5				4				1		...	
Orchitis	479		45		143		18		36		57	
Hydrocele	21		2		15				2		55	
Hæmatocele (malignant tumour)	...								2		...	
Fungus Testis	3				1						...	
Menorrhagia	...										16	
Leucorrhœa									...		1	
Hysteritis											2	
Partus											66	
Abortus									...		11	
Synovitis	103		7		24		7		10		24	
Necrosis	9				4				1		7	
Caries	4				4		1				10	
Contractura	7				1		1				1	
Periostitis	46		1		18		1		11		25	
Exostosis	3								..		..	
Skin Diseases	330		160		274		27		130		319	
Phlegmon and Abscess	712		143		933		172		185		3,430	
Whitlow	167		25		151		11		50		218	
Ulcer	1,108		177		1,071		80		412		2,164	
Tumour	21		2		16		1		4		28	
Atrophy and Debility	467		87		343		21		60		508	
Burning	55		40		76		20		29		99	
Dislocation	42		10		14		1		3		38	
Subluxation	794		79		220		34		50		26	
Fracture	156		7		64		6		21		258	
Contusion and Wounds	1,968		458		1,872		277		807		1,015	
Concussion of Brain	5				5		..					
Killed in Action	..										...	
Gunshot Wound	9		3		7		1		25		..	
Accident	...	17									..	
Suicide and Suicidal Wounds	9				1						3	5
Amputation	4				1						...	
Poisoning	5		4		4		3		2		6	1
Snakebite	...		3		4		1		5		...	
Struck by Lightning	...	1									...	
Drowning	1	1									...	
Asphyxia	1	1									...	
Footsore	64		335		935		75		297		...	
Frostbite			..				..		2			
Murder		4	...				..				...	
Execution									..		...	
Punished			1		1				9		149	
Causes not specified	39		3		3				2		...	
Died absent from their Regiments					...		...		...		...	


Kushkar
Gilgit
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Bamian
Cabul R.
Jelalabad
CABUL
PESHAWUR
Murdan
Nowshera
Cherat
Attock
Abbottabad
Murree
Campbellpoor
Rawul Pindee
Srinuggur
Kashmir
LEH
Ghuznee
Kohat
Bunnoo
Kalabag
Jhelum
Jamoo
Goojrat
Sealkote
Dalhousie
Bukloh
Dhurmsalla
Kangra
Khelat
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KHANDAHAR
Barakzai
Tank
Shahpoor
Goojranwala
Dera Ismail Khan
Goordaspoor
Goondwallah
Tukht Suliman
LAHORE
Umritsur
Mean Meer
Jhung
Jullundur
Hooshearpoor
Leia
Montgomery
Ferozpoor
Phillour
Simla
Sabathoo
Leodhianah
Kussowlie
Quetta
Mooltan
Muzuffurgurh
Sutlej R.
5
Umballa
Mussoorie
Landour
Dehra
Dera Ghazee Khan
Thanesur
Saharunpoor
Hurdwar
Roorkee
Dadur
Kurnal
Muzuffurnuggur
Bujnour
Bahawulpoor
Rajunpoor
Sirsa
KHELAT
Mithunkot
Hissar
Hansi
Paneeput
Meerut
3
Moradabad
Rampoor
Rohtuk
Jacobabad
DESERT
DELHI
Boolundshuhur
Bareilly
Shikarpoor
Goorgaon
Budaon
Gundava
Beekaneer
Rewaree
Sukkur
Allygurh
Shahjehanpoor
Khyrpoor
Ulwur
Muttra
Etah
Furruckabad
Indus River
Bhurtpoor
Mynpoorie
Jessulmeer
Jeypoor
AGRA
Etawah
Kishengurh
Dholpoor
Cawnpore
Jodhpoor
Ajmeer
Nusseerabad
Kerowlee
GWALIOR
Morar
Calpee
Beaur
Tonk
Kalpee
Oorie
BOMBAY
4
Deolee
Banda
Palee
Boondee
Seepree
Kotree
Hydrabad
Jhansi
Shahbundur
Kurrachee
Kotah
Nowgong
Erinpoora
Sirohee
Jubbulpoor
Mt Aboo
Odeypoor
Goonah
Nuggur Parkur
Neemuch
Deesa
Jhalrapatun
Mundesore
Pahlunpoor
Kherwarrah
Saugor
Augur
Bhooj
Mehidpoor
Sehore
Bhopal
Ahmedabad
Oojein
GULF OF CUTCH
Indore
Nursingpoor
PRESIDENCY
Bhopawur
Kaira
Rajkot
Cambay
Sirdarpoor
Mhow
Hoshungabad
Baitool
Chindwarrah
Dwarka
Baroda
Seonee
Nerbudda R.
Nimar
Khundwa
Baitool
Broach
Tapti R.
Asseergurh
Ellichpoor
4c
Kamptee
Surat
Khandeish
NAGPOOR
Dhoolia
Umrawutti
Wurdah
GULF OF CAMBAY
Akola
Hinginghat
Malligaum
Adjunta
Nassik
Chanda
Aurungabad
Jaulnah
BOMBAY
Ahmednugur
Godavery R.
Poonah
HYDRABAD
Kolapoor
20°

MAP

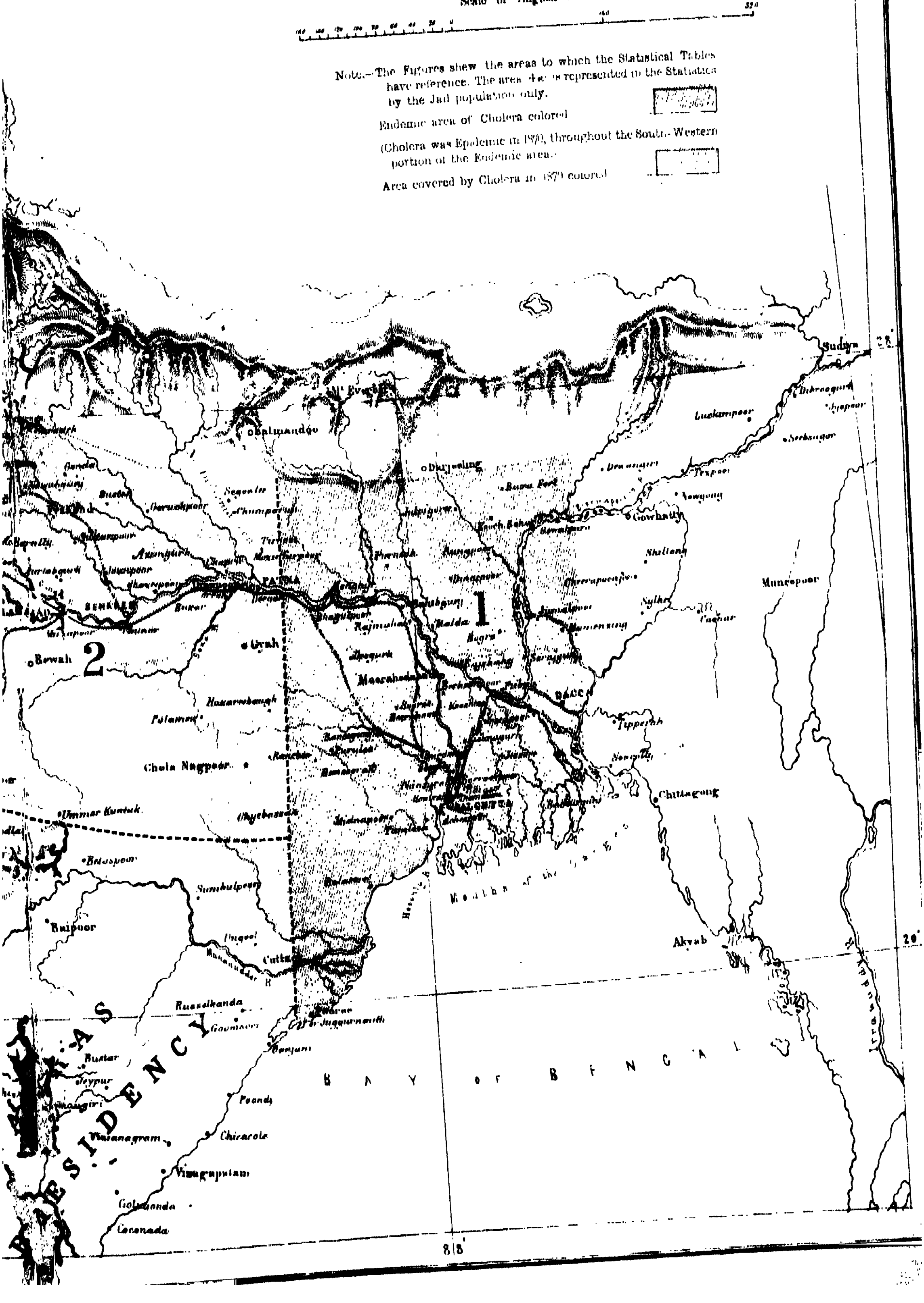
TO ILLUSTRATE THE ANNUAL REPORT

OF

THE SANITARY COMMISSIONER

WITH THE GOVERNMENT OF INDIA,

1870.



Note.—The Figures shew the areas to which the Statistical Tables have reference. The area [illegible] is represented in the Statistics by the Jail population only.

Endemic area of Cholera colored ▨

(Cholera was Epidemic in 1870, throughout the South-Western portion of the Endemic area.)

Area covered by Cholera in 1870 colored ▨

SEVENTH ANNUAL REPORT

OF THE

Sanitary Commissioner with the Government of India.

1870.

WITH

APPENDICES AND RETURNS OF SICKNESS AND MORTALITY AMONG THE BRITISH AND
NATIVE TROOPS, AND ALSO AMONG THE PRISONERS IN THE
BENGAL PRESIDENCY, FOR THE YEAR.

CALCUTTA:
OFFICE OF THE SUPERINTENDENT OF GOVERNMENT PRINTING.
1871.

NOTE.

This Report has been delayed owing to the want of the data required for the preparation of the Annual Statistical Tables for 1870.

The Returns of European Troops were nearly all received early in this year, but those of Native Troops and Prisoners were generally late, and some of them did not arrive till towards the end of August.

J. M. CUNINGHAM, M.D.,
Sanitary Commissioner with the Government of India.

15th September 1871.

TABLE OF CONTENTS.

SECTION I.

EUROPEAN TROOPS.

PARA.		PAGE.
1	Important additions and alterations have been made in the tables for 1870	1
2	The Hill Stations and Convalescent Depôts have been separated and formed into distinct groups	1
3	The groups for European soldiers, Native soldiers, and Prisoners have been made as far as possible to correspond with each other	2
4	The tables now present a very perfect record of the statistics of the classes to which they refer	2
5	Certain alterations have been introduced into the map so as to make it more useful for reference	2
6	The map to be complete, should embrace all India, and show the whole results not only among Troops and Prisoners, but also among the general population of the country ...	3
7	This section of the report will deal mainly with the great questions which are here enumerated	3
8	Of the European force in 1870, five-sixths were in the plains and one-sixth in the hills ...	3
9	Tested by the proportion of separate cases of illness, the sickness was greater than in any of the past seven years	4
10	The chief forms of sickness arranged in the order of their prevalence	4
11	Owing chiefly to the prevalence of fevers in the Punjab, the number of admissions into hospital in any one month was greatest in November	4
12	The ratio of daily sick was higher than in any year since 1862	5
13	The average daily number in hospital on account of the chief forms of sickness approximately estimated	5
14	The great mass of the sickness of the year has been due to a very few diseases which are eminently of a preventible nature	5
15	The death-rate has not been so high as might have been expected from the amount of sickness	5
16	The chief diseases in the order in which they contributed to the mortality ...	6
17	The causes of the deaths out of hospital	6
18	The statistics of the small European force in Bengal Proper have been very favorable ...	6
19	The health of the troops in Fort William in particular has been very satisfactory ...	6
20	In the Gangetic Provinces and Oudh the results were not so favorable	7
21	The third group presents great variations both in sickness and mortality at different stations ...	7
22	In the Agra and Central India group there was much sickness, and the death-rate was above the average of that of the army generally	7
23	In the Upper Punjab stations, and especially at Peshawur, the sickness was very great ...	7
24	The results in the hill stations present generally a very favorable contrast to those of the other groups	7
25	In some of the hill stations the results, especially as regards sickness, compare favorably with those of home stations	8
26	The meteorology of Bengal Proper in 1870	8
27	The North-Western Provinces	11
28	Central Provinces	13
29	Punjab	14
30	The question of concentrating all information regarding the meteorology of India is now under consideration	18
31	The year was remarkable for the few cases of Cholera among European troops	19
32	The women and children of European regiments also suffered little from the disease ...	19

PARA.		PAGE.
33	Among Native troops also the cases were few	19
34	The prisoners were generally exempt, but suffered in a few jails, especially in Behar	19
35	Within a small area the general population suffered considerably	19
36	General statistics of cholera throughout India in 1870 so far as ascertained	22
37	The general facts regarding the distribution of Cholera in this Presidency are shown in the map	23
38	Particulars of the outbreak at Hazareebaugh	23
39	The disease was prevalent in the Hazareebaugh jail, but apparently of a mild form	23
40	Particulars of the outbreak in the cantonment of Fyzabad	24
41	The Sanitary Commissioner for Oudh reported that he had found it impossible to assign any regular course to the epidemic	24
42	The experience of the current year has so far also been very favorable	24
43	Dr. Bryden's memorandum gives an interesting history of the cholera of 1871, and its apparent relations to the cholera of 1870	24
44	Small-pox was little prevalent during the year	30
45	Among the general population small-pox very much less prevalent than in 1869	30
46	Fevers which had been unusually prevalent in 1869 caused still greater sickness in 1870, the ratio of admissions having been higher than in any year since 1858	32
47	Although the mortality from this cause has been high, it was smaller than usual in proportion to the number of cases treated	32
48	The comparative prevalence of the disease in different stations and its distribution by months are shown in Table XV	32
49	The effects of malarious influences are well shown in the statistics of individual regiments, and especially of the 38th Regiment	32
50	The Cherat hill has again proved of much benefit on the occasion of an epidemic at Peshawur	33
51	Native troops and prisoners also suffered much from Fevers in 1870	33
52	Fevers were very prevalent among the people in certain parts	34
53	Among European soldiers 62 deaths from Fevers are believed to have been due to Typhoid	35
54	As regards Apoplexy the results of 1870 were favorable	35
55	As also were those as regards Dysentery and Diarrhœa	35
56	Delirium Tremens was also less prevalent and fatal in 1870 than in 1869	36
57	Hepatitis was more prevalent but less fatal than in 1869	36
58	Venereal disease has prevailed in much the same proportion as in the four preceding years	36
59	The small amount of success of preventive measures has been due to the imperfect manner in which the rules have been administered	37
60	The results of the last six years show a marked improvement on the previous six years	38
61	The returns from Bengal do not compare unfavorably with those of stations in the United Kingdom, which are under the Contagious Diseases Act	38
62	The death-rates according to age are here given	38
63	Dr. Bryden's memorandum in Appendix C discusses the question of the relation of age to mortality, and also the effect of climatic influences on bodies of men in their first year of Indian service	40
64	The mortality in regiments during their first year of Indian service has been far in excess of that of the army generally	40
65	No fair comparison can be made between the sick-rates of new regiments and of the army of Bengal	40
66	The sickness and mortality in newly-arrived regiments have been double what they were in old regiments quartered at the same station	40
67	Nearly one-third of all the invaliding of the last six years has been in men of less than three years' Indian service	41
68	Mortality of all men should in future be shown according to length of Indian service	41
69	Practical importance of the fact that new regiments are subject to great sickness and mortality	41
70	There are no data to show the comparative amount of sickness at different ages	41
71	The mortality and invaliding among young men have been very high	42
72	Statistics of age in relation to mortality and invaliding	42
73	The numbers of married and unmarried soldiers in the three Presidencies	43
74	Comparative sickness and mortality among the married and unmarried soldiers for the four years, 1867—70	44
75	The results, as shown in Dr. Bryden's memorandum here given, are much the same as in previous years	45
76	The returns showing the extent of temperate and intemperate habits in different regiments are all the more valuable, because under the new nomenclature drunkenness is no longer recognized as a cause of admission into hospital	48
77	The ratio of loss by invaliding in 1870 was high, 52·50 per 1,000	48
78	The loss by invaliding has for some years been steadily increasing	48
	This increase has been due to the large number of men sent home for change of climate	48
80	It is of great importance to trace what becomes of the men who are invalided from India	49

PARA. PAGE.
81 Measures proposed to obtain this information 50
82 During the last few years a few of the men invalided for change have returned to India ... 50
83 The increase in the number sent home for change may be due to the lower estimation in which hill stations are now held 50
84 Valuable information might be obtained from the annual Gain and Loss Statement, if the particulars regarding invalids were given as desired 50
85 The ratio of loss from invaliding in India must be taken in connection with the loss from the same cause in the United Kingdom 51
86 The total loss by death and invaliding in 1870 amounted to 74·40 per 1,000 51
87 The sickness and mortality in different stations are compared in Tables XI and XII ... 51
88 The statistics of individual corps are given in Table XIX... 51
89 Average number of days spent in hospital by the men of each regiment 52
90 The strength of officers, men, women, and children quartered in the hills during the hot season of 1870 is here detailed 52
91 The working parties continued to be very successful 52
92 The Convalescent Depôts might give better results if occupied also during the winter ... 53
93 The system of interchanging recovered men at Kussowlie with those at Umballah who required change has been so far successful 53
94 Dr. Bryden's ten-years tables, 1860—69, have nearly been completed 53
95 Daily sick-rate for each month of the ten years, 1860—69, Bengal 53
96 A similar statement for Madras 55
97 A similar statement for Bombay 56
98 Statement showing the ratio of admissions into hospital per 1,000 of strength, 1860—69, Bengal 57
99 Statement showing the mortality in the Bengal army, 1860—69 58
100 Similar statement for Madras 59
101 A similar statement for Bombay 60
102 Comparison of the statistics of sickness in the three Presidencies during the ten years ... 61
103 Comparison of the statistics of mortality in the three Presidencies for the ten years ... 61
104 The changes in the constitution of regiments during their Indian service will be discussed more particularly by Dr. Bryden in the appendix 62
105 The death-rate among women has been considerably under the average of the last ten years ... 62
106 The mortality among children although very high was lower than that of former years ... 62
107 Details of deaths among children in 1870 according to age 63
108 Comparison of the death-rate among children in Bengal and in England 63
109 Statistics of mortality among officers from 1860—69 64
110 The general death-rate of officers from 1860—69 as shown by these returns 66
111 Statistics of officers in 1870 67
112 The general results of mortuary registration in cantonments 67
113 A new form of register for cantonments should be introduced from 1872 69
114 It has been decided to concentrate the statistics of European soldiers in the three Presidencies 69
115 Further steps have been taken to gain information regarding disease, and to improve the health of the British soldier in India 70
116 Measures have been taken to institute a special enquiry into Cholera in India 70
117 Monthly statements of Cholera are now furnished from all parts of the country 70
118 The sanitary enquiry in special localities, as recommended in Section V of the "Instructions," is about to be commenced in the Central Provinces 71
119 The registers of subsoil water-level, chiefly on account of the absence of Cholera, throw no light on Pettenkofer's theory... 72
120 Dr. Douglas Cunningham's report on Pettenkofer's theory, as applied to certain stations in Madras, is given as Appendix B 73
121 Dr. Lewis' report submitted last year has been most favorably received by the highest authorities. His work since 73
122 Dr. Douglas Cunningham's report on microscopic phenomena connected with Cholera, Appendix B 74
123 Meetapore jail has been selected in order to test the effect of sanitary improvements in checking Cholera within its endemic limits 75
124 The returns of Cholera among Indian emigrants in 1870 have not yet been received ... 75
125 A new plan of map for illustrating Cholera is now under consideration 75
126 Facts are now being widely collected, and they will be studied apart from all preconceived theories 76
127 The statement of comparative sickness and mortality in the two wings of the 58th Regiment given in last report requires alteration 76
128 The main facts, however, remain as before, and are incapable of any satisfactory explanation ... 78
129 New hill stations occupied during the year. Raneekhet 78
130 Puchmurree 78
131 In the hill stations a cottage style of barrack has been found best adapted to the climate ... 80

Para. Page.
132 [illegible]dification in plan of quarters for married soldiers in the hills 81
133 Sun-shades have been provided to screen verandah openings in the new barracks... ... 81
134 Minor alterations in other matters connected with accommodation for troops 81
135 The returns of thermometrical observations in barracks, although not much to be relied on, are not unfavorable to the new buildings 82
136 The returns designed to show the protection from disease afforded by upper stories are too scanty to afford ground for generalization 82
137 Special attention has been drawn to the importance of the cleanly watering and feeding of cattle, and the thorough cooking of the meat as the best preservative against tape-worm ... 82
138 Results of water analyses shown in Seventh Report 83
139 Further analyses in military cantonments stopped 83
140 Pumps and filters have been ordered for wells... 83
141 Special scheme for supplying water at Nusseerabad and Gwalior 84
142 Special scheme for Peshawur 84
143 Normandy's condenser not required for Indian stations 84
144 Conservancy. Dry-earth system. Mr. Hickey's carbonizer 84
145 Urinals. Waste water from wash-houses. Disinfectants... 85
146 Sanitary progress reports 85
147 Replies to questions on Indian sanitary matters by the Army Sanitary Commission ... 86

SECTION II.

NATIVE TROOPS.

148 The main facts regarding Native troops and Prisoners will be briefly alluded to ... 87
149 Total death-rate, Regular Native Army, Punjab Irregular Force, and Central India Irregular Force... 87
150 Death-rate among men with their regiments, Regular Native Army, Punjab Irregular Force, and Central India Irregular Force 87
151 The diseases to which the mortality was chiefly due 88
152 High death-rate in the Regular Native Army quartered in the Punjab 88
153 Death-rate at individual stations, 1st group, 2nd group, 3rd group, 4th group, and 5th group... 88
154 Mortality in individual regiments 89
155 Sickness of the year 89
156 Diseases in the order of their prevalence 90
157 Distribution of disease in the Upper Punjab 90
158 Comparative sickness at different stations, 1st group, 2nd group, 3rd group, 4th group, 5th group, Punjab Irregular Force, and Central India Irregular Troops 90
159 Sickness in individual regiments 91
160 Respiratory diseases 92

SECTION III.

JAILS.

161 The vital statistics of prisoners have been favorable 93
162 Diseases which chiefly prevailed in the order of their prevalence 93
163 Their unequal distribution in different groups 93
164 Comparative sickness in individual jails, 1st group, 2nd group, 3rd group, 4th group, 5th group, and 6th group 94
165 Diseases in the order in which they occasioned the mortality 95
166 Mortality from them in different groups 95
167 Mortality in individual jails, 1st group, 2nd group, 3rd group, 4th group, 5th group, and 6th group 95
168 Cholera. History of the several outbreaks generally wanting. Outbreak at Jounpore in February 96
169 Respiratory diseases unusually prevalent and fatal in the Punjab 97
170 Pleuro-pneumonia in the Lahore Central Prison 97
171 The disease in the Mooltan Jail 97
172 A few cases at Dera Ismail Khan 98
173 Excessive mortality in the Lahore Female Jail 98
174 Summary of results among European troops, Native troops, and Prisoners in each province ... 99

SECTION IV.

GENERAL POPULATION.

PARA.		PAGE.
175	Orders of the Government of India on the general review of the sanitary reports for 1869 ...	100
176	Deaths from Bowel Complaints	100
177	Deaths recorded from Injuries	101
178	Deaths from "All other causes"	101
179	Total mortality of the year by months	102
180	The total mortality according to causes as compared with that of 1869	103
181	Weekly and quarterly returns of deaths recommended by the Army Sanitary Commission ...	104
182	Their general remarks on the mortuary registration system which has been adopted in India	104
183	The importance of Vaccination as an integral part of State medicine in India, and the best means of conducting it	105
184	Many matters of interest must be passed by unnoticed	106
185	Marked improvement in the health of Calcutta in 1870 coincident with the new water-supply	106
186	Discoloration of the lake at Nynee Tal owing to infusoria	107
187	Association of the Sanitary Department with the Department of Agriculture, Revenue and Commerce	107

APPENDIX A.

GENERAL REVIEW OF THE ANNUAL REPORTS OF THE LOCAL SANITARY COMMISSIONERS FOR 1869. 109—137

APPENDIX B.

DR. DOUGLAS CUNNINGHAM'S REPORT ON CHOLERA. 139—231

The Table of Contents is prefixed to the Report.

APPENDIX C.

DR. BRYDEN'S REPORT ON THE INFLUENCE OF AGE AND LENGTH OF SERVICE AS AFFECTING THE MORTALITY AND INVALIDING OF THE EUROPEAN ARMY OF THE BENGAL PRESIDENCY. 235—297

The Table of Contents is prefixed to the Report.

ANNUAL RETURNS OF THE EUROPEAN AND NATIVE ARMIES AND OF THE JAIL POPULATION OF THE BENGAL PRESIDENCY FOR THE YEAR 1870.

The Table of Contents is prefixed to the Returns.

ANNUAL SANITARY REPORT FOR 1870.

SECTION I.

EUROPEAN TROOPS.

Important additions and alterations have been made in the tables for 1870.

BEFORE proceeding to consider the sanitary history of the European army in the Bengal Presidency during 1870, some important changes which have been introduced into the annual tabular statements of sickness and mortality must be explained. With the year 1869 ended the first decennial period in which we have full particulars regarding British soldiers in this part of India, and the very valuable statistics which Dr. Bryden has collected and tabulated for these ten years are now being arranged, so that the important data which they contain may be classified and presented in the form in which they will prove most useful and convenient for reference. Of these general tables further mention will be made in a subsequent portion of this report. I have alluded to them now merely to point out in what respect the annual statements for 1870 differ from those which have been given for preceding years. From the first Dr. Bryden has recognized the great importance of dividing the army into certain groups of stations occupying areas which are subject to similar geographic and climatic conditions, and which, so far as our knowledge yet goes, appear to be governed by like epidemic influences. On this latter point difference of opinion may, no doubt, exist, and it may be questioned whether we are yet in a position to map out the natural provinces of disease with any accuracy; but the mere attempt to study the facts on such a basis is calculated to attain good results, while at the same time the importance of considering the details, not only as a whole, but as they affect different portions of the continent, will be generally admitted. The statistics of the Bengal Presidency taken merely *en masse* would convey but a very imperfect and indefinite idea of the distribution or prevalence of disease, nor would they be of much value in considering its history or the circumstances which govern either its increase or diminution. To investigate these important questions, it is essential that we should have not only the statistics for the army in general, for each station and regiment, but also for those groups of stations taken together which occupy well defined areas, and which therefore afford material for generalization and for the proper study of the causes of disease.

The Hill stations and Convalescent depôts have been separated and formed into distinct groups.

2. The provincial areas which have hitherto been adopted remain generally as they were, but two important changes have been made—the hill stations and convalescent depôts, which are also situated in the hills, have been removed from the provinces in which they formerly appeared, and have been formed into two additional and distinct groups. In the case of the hill stations this alteration was indispensably necessary. The number of regiments quartered in the hills has considerably increased of late years, the climatic influences to which they are subject are very different from those which are to be found in the plains, and it is very important not only to show the results of hill stations separately, but also to remove them from those groups of plain stations, the statistics of which were no doubt affected by being mixed up with those of places which differ from them so materially. The necessity for separating the convalescent depôts has not been so clear. The men belonging to them have

been selected on account of ill health, and the results therefore represent not the sickness of the depôts so much as the sickness of those stations in the plains from which they have come. If each group of plain stations had a separate hill sanitarium, the whole might best be considered together; but the convalescent depôts generally draw their men from more than one group, and cannot therefore be correctly taken in connection with the statistics of any particular area. On the other hand, it is of great importance that the annual history of these depôts and their beneficial effects should be carefully considered and weighed; and it has therefore been determined, as the best arrangement which is possible, that they should be separated and form a special group by themselves.

The groups for European soldiers, Native soldiers and Prisoners have been made as far as possible to correspond with each other.

3. Another important alteration has been made in assimilating the grouping of troops and prisoners, so that the divisions under the different heads of European soldiers, Native soldiers, and Jails may correspond. The system of grouping has always been applied to them all, but owing to circumstances which need not here be detailed, the groups for these different sections have not embraced exactly the same areas. This defect has been remedied so far as can be done, and comparison can now be made between the European soldiers and the Native troops or Prisoners occupying any given area. Exact comparison is not possible, because even within a single province the distribution of each class is very unequal. In the first group, for example, the European force is not represented over great part of the area which it embraces, and a similar remark applies, though rarely with the same force, to other portions of the country. Within the area which lies to the south of the Nerbudda river, there are no troops belonging to this Presidency with which comparison can be made, and this group, unlike any of the others, refers entirely to Prisoners.

The tables now present a very perfect record of the statistics of the classes to which they refer.

4. Other changes in the tables which have been made with a view of rendering them more complete, or of showing the results with greater clearness, will be alluded to as the various points which they illustrate come under notice. The statements which have been added with special reference to the distribution, both in place and time of climatic disease, are of particular interest, and the whole series, embracing as it does such full details regarding the sickness and mortality of British soldiers, of their wives and children, of Native troops and of Prisoners, may justly take its place as one of the most complete records of vital statistics which could well be framed.

Certain alterations have also been introduced into the map, so as to make it more useful for reference.

5. In the map also which is prefixed to the report certain alterations have been made, which will render it more useful and convenient for reference. The areas of the various groups have been marked out by dotted lines. It will thus be easy to see what portion of the country is embraced in any particular group, and at the same time any place referred to in the tables can be easily found even by one who has little knowledge of the geography of India. It may be well to state here the names under which these groups will be spoken of.

No. I represents Bengal Proper, great part of which is colored as the endemic area of cholera.

No. II embraces the large tract lying on either side of the valley of the Ganges, and is known by the name of some of the chief military cantonments which it contains—Dinapore, Benares, Cawnpore and the stations of Oudh.

No. III includes generally the Meerut and Rohilcund Divisions—an area which is bounded to the east by a line running close to the 80° of longitude, and by another line which bends round on the west and south very much after the course of the river Jumna.

No. IV includes Agra and Central India.

No. IVA embraces that portion of the Central Provinces which lies to the south of Nerbudda, but, as has been already stated, is represented only by the jail population.

No. V is the Punjab.

The map to be complete should embrace all India, and show the whole results not only among troops and prisoners, but also among the general population of the country.

6. In some respects the map is still defective, it is somewhat wanting in clearness; but the chief objection to it is that it does not include the whole continent of India. Until the statistics of the country, not only as regards the European force, the Native army and the Prisoners, but also as relates to the general population of the country, have been investigated as a whole; and until the facts regarding the meteorology have also been collected and examined on the same wide and scientific basis, we cannot enter on the study of the distribution of disease with any hope of success. When such data both as regards mortuary statistics and meteorological phenomena are available for all India, and can be studied year by year as parts of a whole, we shall have a body of evidence and a means of investigation such as can be afforded by no other country in the world. The subject is of vast importance both in its scientific bearings, and in the practical results which may be anticipated.

Some steps have already been taken to attain this great object, but its importance cannot be too strongly and frequently urged, until complete and satisfactory arrangements have been made for its accomplishment.

• This section of the report will deal mainly with the great questions which are here enumerated.

7. Leaving these more general considerations, regarding which I propose to offer some further remarks hereafter, I shall now proceed to the discussion of the vital statistics of the European army in the Bengal Presidency during the year 1870, as shewn in Dr. Bryden's Tables. I propose to consider the strength and distribution; the amount and variety of sickness; the mortality of the year and the chief causes to which it has been due; the results in the different groups of stations and how far these results have been due to individual places or regiments; the meteorology of the year and its connection with these results; the distribution and comparative prevalence of the chief diseases, such as Cholera, Small-pox, Fevers, Apoplexy, Bowel complaints, Delirium tremens, Hepatitis and Venereal affections. I shall then discuss the relation of age to mortality; the relative sickness and death rate among married and unmarried men; the effects of temperate and intemperate habits; invaliding, the proportion of loss which it has occasioned, and the chief causes to which it has been due; and the total loss of the year. I shall then compare the results in different stations and regiments; the statistics of hill stations and convalescent depôts, and shall next briefly advert to the general facts regarding the vital statistics of the European force in the three Presidencies during the ten years from 1860 to 1869. I shall then consider the statistics of women and children and of officers, the results of the mortuary registration in cantonments, and shall conclude this portion with a statement of the steps which have been taken to render the statistics of the European army in India more complete than they have yet been. The questions of the progress in providing barrack accommodation, of any modifications which have been made in the standard plans, and of other sanitary requirements as regards food, water-supply, and conservancy will then be discussed.

Of the European force in 1870, five-sixths were in the plains and one-sixth in the hills.

8. The strength of the European army during 1870 averaged 33,373—a number somewhat under that for 1869, but greater than it was in 1868. In round numbers this force was distributed as follows:—In the first group 2,000 men, in the second 7,200, in the third 3,700, in the fourth 4,200, and in the fifth 10,500. In the hill stations there were 3,400, and in the convalescent depôts about 2,000 more. It may thus be stated generally that of the total of 33,300, there were 27,600 men in the plains and 5,400, or about one-sixth, in the hills. Of the latter some were quartered in hill stations, either throughout the whole or for greater part of the year; some

were employed as working parties, and others again were attached to the convalescent depôts during the hot season and rains.

Tested by the proportion of separate cases of illness, the sickness was greater than in any of the past seven years.

9. Taking the army as a whole, the sickness was very great and surpassed that of 1869, a year which was remarkable for its unhealthy character. The extent of sickness may be estimated by one of two standards, or rather it ought to be estimated by both—by the proportion of admissions into hospital, which represent the number of individual cases of illness, and by the proportion of daily sick in hospital, the average number who are constantly inefficient. Tried by the first of these standards, the year 1870 gives a ratio of admissions equalling 1,731 per 1,000 as compared with 1,729 in 1869—ratios which are higher than those of any year since 1863. In the five years which ended with 1863, the rate had varied from 1,838 to 2,228. In the seven years which have followed it, the proportion has fluctuated between a minimum of 1,412 in 1867, and a maximum of 1,731 in the year which has just passed. In this respect 1870 presents very unfavorable results. Taking the separate groups, the Punjab with 2,323 admissions per 1,000 was the most unhealthy, then comes the fourth group with 2,122, then the second group with 1,354, and next the third group with 1,284. Lower Bengal with only 1,179 shows in this respect the most favorable condition. In the hill stations the ratio was 1,042—a result which though comparatively favorable is not so favorable as might have been expected. In this and in all other such comparisons the convalescent depôts, consisting as they do only of sickly men, cannot properly be taken into consideration.

The chief forms of sickness are enumerated in the order of their prevalence.

10. What were the forms of sickness which chiefly contributed to these results? Arranged in the order of their relative prevalence they stand as follows:

	Admitted per 1,000 of average strength.	Proportion of admissions out of every 100 admissions.
Fevers ...	834·5	48·18
Venereal disease ...	202·7	11·70
Wounds and Accidents	85·9	4·96
Abscess and Ulcers...	85·0	4·91
Respiratory diseases	77·1	4·45
Rheumatism ..	69·7	4·03
Diarrhœa	65·2	3·77
Hepatitis ...	57·0	3·29
Dysentery ...	37·6	2·17
Eye diseases	25·6	1·48
Phthisis pulmonalis	10·1	·58
Spleen disease ...	6·7	·39
Delirium tremens	5·6	·32
Apoplexy ..	3·0	·17
Cholera ..	1·5	·09
Scurvy	1·0	·06
Small-pox ..	·6	·04
All other causes ...	163·1	9·41
Total	1731·9	100·00

An examination of the Tables II—VII will shew how far these results were modified in the different groups.

Owing chiefly to the prevalence of fever in the Punjab, the number of admissions into hospital in any one month was greatest in November.

11. The greatest proportion of admissions occurred in the month of November, when the ratio which had been only 106 in January and 101 in February rose to 183 per 1,000—a result which was chiefly due to the marked prevalence of fever in the Punjab. A reference to Table VI will shew that in that month the cases of sickness in this province equalled 301 per 1,000 of strength, and by far the greater number of them were fevers. Excluding the group of hill stations, Bengal Proper, it may be remarked, presents both the smallest minimum of admissions in any one month and also the lowest maximum.

The ratio of daily sick was higher than in any year since 1863.

12. Taking the army as a whole, 63·8 out of every 1,000 men were on an average in hospital daily throughout the year. Tried by this standard of health again the results of 1870 are very unsatisfactory, and shew a greater proportion of inefficiency than in any year since 1863. The ratio in that year was 69·6 per 1,000; since then it has fluctuated from 62·1 in 1864 to 52·5 in 1868. For the 10 years 1860—1869 the average has been 67·1, but this result has been mainly due to the high ratios of the earlier years. During the first half of this decennial period the proportion of daily sick averaged 74·4 per 1,000; during the second half it equalled only 56·6. In the first, second, and third groups in 1870, the daily proportion of sick, 59, 61 and 58 per 1,000, was comparatively small. In the Punjab, on the other hand, the ratio amounted to 69, and in the fourth group it attained a maximum of 77 per 1,000.

The average daily number in hospital on account of the chief forms of sickness approximately estimated.

13. The tables do not shew the proportion of the number of daily sick which was due to individual diseases, but this important information may be obtained with approximate accuracy by adding together the numbers remaining in hospital under the chief heads at the close of each month, as shewn in the monthly returns, and taking the average of these twelve totals. Such a calculation for 1870 gives the following results. The diseases are arranged in the order in which they contributed to the inefficiency of the army, the figures representing not ratios, but the average number daily in hospital throughout the year.

Statement shewing the average number of men daily in hospital suffering from the chief disease in 1870.

Fevers	587	Small-pox	1
Venereal diseases	430	Cholera	·9
Diseases of the Liver	117	Apoplexy	·8
,, Chest ...	112	Other diseases	587
Diarrhœa	63		
Dysentery	61	Total number of men on an average daily in hospital throughout the year ...	2017·7
Wounds and Accidents ...	30		
Ophthalmia	28		

The great mass of the sickness of the year has been due to a very few diseases which are eminently of a preventible nature.

14. As regards sickness among European troops, the general characteristics of the year may be broadly stated to have been a remarkable absence of Cholera, and a great prevalence of Fevers within certain areas. These points, as well as the relative amount of sickness due to the other chief diseases, will be fully discussed hereafter as they affected particular provinces, individual stations, or regiments. But glancing now at the main facts of the year relating to sickness among European soldiers in this Presidency, two conclusions of no small importance force themselves upon our notice; first, that the great mass of the sickness has been due to a very few forms of disease; and secondly, that these diseases are beyond all question to a very great extent preventible.

The death rate has not been so high as might have been expected from the amount of sickness.

15. Seven hundred and thirty-one European soldiers died in this Presidency during the year, or a ratio of 21·90 per 1,000. Compared with former years this proportion is not high, nor is it so great as might have been expected from the amount of sickness. During the previous ten years 1860—1869, the mortality has varied from 20·11 in 1866 and again in 1868 to 45·93 in 1861. In 1869 the results were little better, for the ratio equalled 42·89 per 1,000. The average for the ten years has been 29·98. The results of 1870 may therefore be regarded as comparatively favorable. The general average for the whole army has been raised considerably by the number of deaths in the Punjab, where they amounted to 24·48 per 1,000. In the fourth and second groups also the proportions (22·23 and 22·97) were above the average. In the third and first groups the results were favorable, for here the ratio equalled only 18·65 in the one and 16·54 in the other.

The chief diseases in the order in which they contributed to the mortality.

16. Arranged according to the extent of the mortality which they occasioned the chief diseases stand thus; the statement also shews the proportion of deaths out of every hundred deaths which were due to each:—

	Died per 1,000 of strength.	Proportion of out of every 10
Fevers ...	4·28	19·56
Hepatitis ...	3·71	16·97
Dysentery ...	2·07	9·44
Apoplexy ...	1·62	7·39
Respiratory diseases	1·53	6·98
Heart disease ...	1·50	6·84
Phthisis pulmonalis	1·47	6·70
Cholera ...	·63	2·87
Wounds and Accidents	·30	1·37
Delirium tremens ...	·27	1·23
Atrophy and Anemia	·21	·96
Small-pox ...	·18	·82
Spleen disease ...	·06	·27
All other causes ..	2·54	11·63
Died out of hospital	1·53	6·97
Total ...	21·90	100·00

The causes of the deaths out of hospital.

17. Some particulars of the 51 deaths which occurred out of hospital will be found in the first portion of Table XVII. It appears that of these 17 were drowned, 11 more deaths were caused by accidents, 7 were due to excessive drinking, one to rupture of the spleen, one man was struck by lightning and 14 committed suicide. The total loss of 1·53 per 1,000 from such causes is unusually high, higher indeed than it has been in any previous year. In 1869 there had been a maximum, including the period up to that year, of 1·45. In 1868 and again in 1866 the ratios (1·36 and 1·40) had been high, but they were exceptional. The proportion has generally been considerably less, and the average for the ten years 1860—69 has been only ·86 per 1,000.

The statistics of the small European force in Bengal Proper have been very favorable.

18. Having glanced at the sickness and mortality throughout the army as a whole, the results in each province may next be examined. The first of these, so far as European troops are concerned, is represented by a force slightly under 2,000 men occupying the three stations, Fort William, Dum-Dum and Barrackpore, Berhampore, where there was a small detachment during the first part of the year, having been abandoned as a station for European troops in the month of June. The statistics of 1870 in this group have been very favorable. With an admission rate of 1,179 and a sick rate of 59 per 1,000, the deaths numbered only 33 or 16·54 per 1,000. Compared with the previous ten years these figures are satisfactory. The admission rate, which has been as high as 2,177, has never been so low before, and the mortality in only one of them, 1867, was so small as it has been in 1870. As a rule it has far exceeded the ratio of the past year.

The health of the troops in Fort William in particular has been very satisfactory.

19. Tables X, XI and XII shew the details for the different stations of which each group is composed, while Table XIX again furnishes particulars of each of the corps which formed the several garrisons. The remarkable health of the European troops in Fort William was adverted to in last report, and another year's experience gives similarly satisfactory results. The daily sickness, 67, was above the average, but the ratios of admissions (1,289) and of deaths (12·57) bear favorable comparison with those of many of the stations in the Upper Provinces, which have usually enjoyed the reputation of being more than ordinarily healthy. At both Dum-Dum and Barrackpore the cases of sickness, 1,019 and 1,185 per 1,000, were much below the proportion in the army generally; and the number daily in hospital, 55 and 49 per 1,000, was

considerably under the ratio for Fort William. At Dum-Dum the death rate (18·) was also favorable, and at Barrackpore (22·62) it was little in excess of the ratio for the Presidency as a whole.

In the Gangetic Provinces and Oudh the results were not so favorable.

20. Among the troops in the second group, averaging 7,185 and distributed in 11 different cantonments, the results were not so favorable. The admission rate (1,354), the daily sick rate (61), and the death rate (22·97) were all higher than in Bengal Proper. A glance at the tables of admissions, &c., in each station will shew great differences in the details. The daily sick rate varied from a maximum of 108 at Cawnpore to a minimum of 32 at Hazareebaugh; the admission rate which was only 877 at Hazareebaugh was 2,375 among a small body of men at Chunar and 1,764 at Cawnpore. The mortality at Seetapore was only 7·52 per 1,000; at Dinapore it was 31·80. The second division of Table XIX shews equally striking differences in the individual corps.

The third group presents great variations, both in sickness and mortality at different stations.

21. The third group is represented by 3,700 men divided into seven stations, and within this area the statistics of the year shew good results. The cases of sickness equalled 1,284 per 1,000, the daily sick 58, and the death rate 18·65. In some of the garrisons the ratios were much more favorable—Shajehanpore, Bareilly, Roorkee and Muttra all shew a mortality under 13 per 1,000. At Meerut and Delhi on the other hand the mortality (27·86 and 29·50 per 1,000) was high. The admission rate varied greatly. At Bareilly it was only 790; at Roorkee it equalled 1,655. As will be seen hereafter, these marked differences were due to the great prevalence of fevers over a portion of the tract which is embraced by this group of stations.

In the Agra and Central India group there was much sickness, and the death rate was above the average of that of the army generally.

22. The troops in the Agra and Central India group suffered much from sickness, and the death rate among them was above the average. The admissions equalled 2,122 per 1,000, the daily sick 77, and the deaths 22·23. All of the stations suffered to a considerable degree from sickness. The lowest ratio of admissions was 1,401 per 1,000 in the Gwalior citadel. At Jhansie the ratio equalled 2,916, but this excessive sickness was due in great measure to the effects of Nusseerabad on the health of the regiment in the year previous. At the same time it is to be noted that the extent of sickness in the regiments quartered in this part of India although great was not in excess of the average of the previous ten years, and the death rate was favorable when compared with that of many of them. In some of the stations the mortality was small. At Agra, for example, it was only 11·41 per 1,000.

In the Upper Punjab stations, and especially at Peshawur, the sickness was very great.

23. In the Punjab also sickness was generally very prevalent, and the admissions into hospital throughout the province equalled 2,323 per 1,000. The sickness was very unequally distributed. In five of the stations it was under a ratio of 2,000 per 1,000, in seven of them it varied between two and three thousand, while at Peshawur, notwithstanding the temporary occupation of the Cherat Hill by a portion of the garrison, it amounted to the very large proportion of 4,061 per 1,000. In other words, at Peshawur every man on an average throughout the year was four times admitted into hospital. The disease which caused such unsatisfactory results, as we shall presently see, was malarious fever of the same type as had been so prevalent among the men of the garrison in the year previous. The death rate for the province, 24·18, varied in the different stations from 13·45 at Jullundur to 33·23 at Peshawur, and to more than 39 in each of the small garrisons of Attock and Umritsur.

The results in the hill stations present generally a very favorable contrast to those of the other groups.

24. The hill stations, which have now been separated and formed into a sixth group, shew results which contrast favorably with those of the other groups already mentioned. Here the admissions equalled 1,042, and the daily sick 40. The amount of sickness indicated by these figures, although comparatively favorable, is not so favorable as might have been expected. And

yet I observe that the ratio of constantly sick (40 per 1,000) is less than that of the army serving in the United Kingdom, in which the ratio for 1868 was 43, and the average ratio of the years 1860—67 was 49 per 1,000. In the same manner 1042 appears to be a large proportion of cases of illness for a hill climate, even bearing in mind that much of the sickness was no doubt attributable to previous residence in the plains, but the ratio on home service does not fall far short of this proportion. In 1868 it equalled 894, and in the years 1860—67 it had averaged 963 per 1,000. The death rate for hill stations, 11·17, is very favorable.

In some of the hill stations the results, especially as regards sickness, compare favorably with those of home stations.

25. It is interesting to compare these results more fully with those at garrison towns in the United Kingdom. A complete comparison cannot be made, as many of the hill stations were occupied only during a portion of the year, and the working parties generally were employed only during the hot weather and rains; but the statistics for the three stations, Darjeeling, Chuckrata, and Dugshaie, may be placed side by side with those from the different groups of stations in Great Britain and Ireland, as shown in the Army Medical Report for 1869.

Groups and Stations.	RATIO PER 1,000 OF STRENGTH.					
	1869.			1860—68.		
	Admitted into Hospital.	Died.	Constantly sick.	Admitted into Hospital.	Died.	Constantly sick.
HOME SERVICE.						
1. Seaport Towns	794	9·61	42·97	1,008	9·45	53·03
2. Dockyards and Arsenals ...	878	10·27	42·24	1,049	9·61	53·24
3. Camps	802	7·16	39·83	913	6·86	47·52
4. Large manufacturing towns	844	9·63	46·18	1,043	9·39	48·55
5. London and Windsor ...	706	8·28	44·12	628	7·54	49·99
6. Dublin	924	12·57	51·93	939	9·28	52·68
7. Stations of Depôt Battalions not included in preceding groups ...	940	10·71	48·53	1,036	9·01	50·48
8. Remaining stations ...	692	7·36	32·56	849	7·79	37·84
Total, including men detached from their corps ...	797	9·41	40·82	956	9·52	48·54
HILL STATIONS, BENGAL.	1870.			1860—69.		
Darjeeling	1,890	15·62	62·5	976	9·66	39·4
Chuckrata	972	18·73	45·0	a new station.		
Dugshaie	641	6·13	29·4	915	13·40	48·4
Hill stations as a group ...	...	...	...	1,069	14·78	4·95

The returns from Darjeeling for 1870 are very unfavorable, and the death rate at Chuckrata is also high. It is to be observed, however, that of the total loss of 18·73 at this last station, 4·99, or more than one-fourth part, was due to accidental causes. Both as regards sickness and mortality, Dugshaie shews for 1870 a smaller ratio than that of any English station, the statistics for which are given in the above table. For the ten years 1860—1869, Dr. Bryden givesthe admissions per 1,000 at all the hill stations in this Presidency as averaging 1,069, the daily sick 49·5, and the deaths 14·78 per 1,000.

The Returns of the Convalescent Depôts will be more conveniently considered in connection with the question of invaliding.

The meteorology of Bengal Proper in 1870.

26. Having now directed attention to the main facts regarding the sickness and mortality of the European army in the Bengal Presidency during 1870, both as they affected the whole force and also the different groups into which it has been divided, the meteorology of the year calls for attentive consideration. For the data on this important subject I am indebted to the Meteorological Reporters of Bengal, the North-Western Provinces and the Punjab, and also to the Sanitary Commissioner of the Central Provinces. The following extracts are taken from Mr. Blanford's report: —

Comparison of the mean Temperature of each month of 1870 with that of the corresponding month in 1869.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Madras	—2·0	—2 8	—2·5	+0·1	+0·6	—4·6	—4·3	—2·1	—1·3	—2·1	+1·7	—2·2	—1·6
Port Blair	—2·7	—4·1	—6·2	—5·7	—1·1	—3·3	—3·4	—4·6	—2·2	—2·8	—2·6	—2·9	—3·5
Akyab	...	...	...	...	...	—0·5	...	—0·6	+0·1	+0·7	+0·2	—1·0	...
Chittagong	+1·0	+0·6	—0·7	—1·7	+0·5	—1·5	—0·2	—0·1	—1·1	...	+2·5	—1·4	—0·2
Cachar	...	...	...	...	...	...	—0·9	—0·1	...	+0·7	+3·0	—1·0	...
Dholebagaun	+1·5	...	—1·5	—1·5	+1·5	—2·1	—1·0	...	—0·8	...	+4·3	—0·5	...
Dacca	+0·6	+0·9	—0·2	—1·2	+0·7	—1·6	—1·2	—2·0	—0·7	+1·5	+2·8	—0·7	—0·1
Goalparah	+3·5	...	...	...	+3·9	—1·8	—2·0	—0·5	—0·8	+1·9	+3·7	—0·5	...
Darjeeling	+1·3	+2·5	—1·0	—3·8	—1·3	—1·7	—1·2	—1·0	—0·1	+1·4	+1·5	—1·0	—0·4
Jessore	—2·8	—0·9	+0·2	—2·8	+0·2	—1·7	...	—2·0	—0·2	+1·4	+4·1	—1·3	—0·5
Berhampore	+1·2	+0·3	+0·4	—3·1	+1·0	—1·5	—0·6	—2·2	+0·6	+1·1	+2·5	—1·4	—0·1
Calcutta	—1·8	+0·9	+0·6	—2·2	+0·9	—1·7	—0·1	—2·1	+01	1·2+	+2·5	—1·9	—0·3
Saugor Island	—1·9	+1·7	—0·1	—1·3	—0·7	—1·5	+0·4	—1·8	+01	+1·3	+2·6	—2·1	—0 3
Cuttack	—2·2	—2·6	—1·7	—2·0	+0·5	—0·2	+1·4	—0·7	—0·3	+1·3	+1·9	—4·0	—0·7
False Point	—2·7	—2·0	—0·5	—1·2	—0·4	—0·7	+1·1	—0·6	+0·2	+1·6	+2.9	—2·0	—0·4
Hazareebaugh	—0·5	+1·2	+0·9	—4·9	+1·8	—1·4	+0·6	+2·1	+0·3	+2·8	+2·6	—0·5	+0·4
Monghyr	+0·9	+1·6	—0·5	—3·1	+0·7	—1·1	—0·5	—1·4	—0·3	+1·6	+2·0	—1·0	—0·1
Patna	—1·1	—1·0	—0·9	—5·7	—1·3	—2·2	—0·2	—1·2	—0·1	+1·5	+2·2	—1·7	—1·0

Wind.

A recent examination of the existing registers of wind direction in Bengal, the Central and North-West Provinces, and the Punjab, which relate to periods of from three to ten years,* shows that the normal course of the monsoon currents is as follows :—Beginning with the month of October, or the close of the rainy season, calms or westerly winds predominate in the Upper Provinces, while in the lower North-West Provinces and Bengal the winds set in from west and north-west, becoming more northerly in the delta and north-east in the Bay of Bengal, especially on the Indian side. In the Central Provinces the prevailing directions are north and north-east during the winter months, and in the Punjab, north along the course of the Indus, and under the lea of the Suliman range, becoming more westerly as the distance from the hills increases. From February onwards the northerly elements decrease in amount, calms are less frequent in the Upper Provinces, and westerly and north-westerly winds begin to predominate over the greater part of Northern India, while in the Gangetic delta and on the coast of the Bay the wind is most frequent from the south. At Ajmere it is chiefly west and south-west, the direction being probably influenced by the neighbouring Aravalli range.

In the hot weather months, the dry westerly or continental and the southerly or coast currents meet in Bengal in the region of barometric depression before adverted to that lies to the westward of the delta.

As the season advances the latter penetrate further up the Gangetic valley as easterly or south-easterly winds, while over Western and Central India, the westerly current draws round to southward and sweeps over the country, bringing the monsoon rains. At Calcutta the most rainy quarter for the wind is south-south-east. In September the monsoon slackens, but continues to blow from the same direction over the western half of India, while in Bengal and generally over the eastern half it veers to south-east, and a further veering in October to east and north-east on the Coromandel Coast, coincident with the setting in of the north-east monsoon in the upper part of the Bay, brings the principal rainfall of the year to the previously dry region of the Carnatic.

In the early months of 1870 the land winds were more steady and persistent than usual in Bengal, as was remarked in a note appended to the report for 1869 (p. 21). Hence, doubtless, the comparative dryness of these months, of which the rainfall and humidity tables afford evidence. In June the south-west monsoon set in with more than average steadiness, but with less easting than usual, and these peculiarities persisted throughout the rainy season, except in Orissa, where in September and October the wind veered round to the eastward and brought the abundant rainfall which preserved that province from the dearth which for some time appeared to threaten it. The southerly monsoon lasted later than usual in Lower Bengal, and it was not until nearly the middle of November that the land winds fairly set in. In December they blew very steadily, with more than average westing in Lower Bengal and Orissa, which appears to have been coincident with, and perhaps, therefore, due to, an excessive barometric pressure in Central India.

Rainfall.

A chart constructed on the table of average rainfall given in the report for 1869 shows the normal distribution of rainfall in Bengal to be somewhat as follows :—On the Arakan Coast and in Eastern Bengal the average annual fall exceeds 100 inches. This high fall prevails to the eastward of a line which, starting from the mouth of the Megna, runs northward to near the junction of the Soorma and Barak rivers, whence, turning to the west, it follows the outline of the Garrow Hills at a distance of about 50 miles from their foot. Again turning north its further course about coincides with that of the Jaboona (Brahmaputra) river to near Goalparah, and finally turning again to the eastward and falling a little to the south, it follows approximately the main watershed of the Khasi hills, leaving Assam outside the area of more than 100 inches. The rainfall of the outer Himalaya exceeds 100 inches. The line of 80 inches follows a similar direction to the 100-inch line in the southern part of its course, but 40 or 50 miles to the west of it. It passes east of Dacca, and then turning to the west and north-west, it runs up to the foot of the Himalaya, enclosing Dinagepore and all the Terai that lies to the north of the delta. Another portion of the same line in Assam would run round the central part of the province, passing between Goalparah and Gowhatty in Lower Assam, and enclosing a strip of the valley about 100 miles in length, in which the average rainfall appears to be below 80 inches. The line of 60 inches starts from the coast of Orissa, north of the Mahanuddy delta. It includes Midnapore and the whole of the Gangetic delta, except the extreme north-west corner, and passing between Krishnaghur and Berhampore, runs northward till it approaches within 40 miles of the 80-inch line; it then turns to the north-west and runs nearly parallel with this latter up to the foot of the hills. Over the Hazareebaugh plateau and the high lands south of the Ganges, as well as throughout the Central Provinces, the

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* This examination is not yet completed. The present sketch is based on the following data :—

Rawul Pindee ...	... 3 years	Benares ...	... 7 years
Dera Ismail Khan	... 3 ,,	Hazareebaugh ...	... 3 ,,
Lahore ...	... 3 ,,	Calcutta ...	... 10 ,,
Mooltan ...	... 3 ,,	Dacca ...	... 3 ,,
Ajmere ...	... 7 ,,	Cuttack ...	... 3 ,,
Agra ...	... 7 ,,	Nagpur ...	... 3 ,,
		Jubbulpur ...	... 3 ,,

average rainfall ranges between 40 and 50 inches per annum. Only in the Gangetic valley above Monghyr does it fall below 40 inches.

In 1870 the distribution of rainfall differed from this normal state of things in the following particulars:—In the Central Provinces (including Sambalpur) and the hilly country to the west of the Gangetic delta, the rainfall was higher than usual, while the Orissa Coast tract and the Ganges delta had less than the average, more especially along a line passing through False Point, Midnapore, and Burdwan. The stations in Behar registered about the usual quantity (in some cases much more), and the fall was also excessive on the outer Himalaya and over the adjoining plains at their foot. In Assam there appears to have been about the average quantity at Gowhatty and Nowgong, considerably less than the average at Shillong, and an excess at Tezpore and Seebsaugor, while in Eastern Bengal and Arakan the rains were generally somewhat deficient, except at Sylhet and Noakhally; some of these local irregularities appear to be very anomalous.

The earlier months of the year were drier than usual in nearly all parts of Bengal. In June the rainfall was in excess of the average in Assam and Sylhet and in the districts north of the Ganges, but considerably less on the Arakan Coast and somewhat less in Orissa and the Burdwan Division. September was an unusually wet month in Assam, Eastern Bengal, and Arakan, and October in Behar and the northern districts. In Orissa the rains were deficient in every month up to October, in which month and November this province received rather more than usual. December was everywhere a very dry month.

The meteorology of the North-Western Provinces.

27. Of the meteorology of the North-Western Provinces, Mr. Elliott, the Officiating Reporter, has favored me with the following summary:—

General character of the weather during the year 1870 in the North-Western Provinces.

The year 1870 was much less abnormal in its meteorological features than the two preceding years.

The cool season, which commenced in the beginning of November of the previous year, lasted until the end of March, and had very nearly the same mean temperature as the corresponding period of the three preceding years. In the months of February and March a number of thunderstorms occurred, some of which were very violent. These cooled the atmosphere and delayed the arrival of the hot weather.

The hot season, which dated from 1st April to the 12th or 13th of June (on which days was observed the rapid increase in the humidity of the atmosphere which accompanies the south-west monsoon and precedes by a few days the commencement of the rains), was slightly cooler than the average of previous years. The mean temperature was owing to the comparatively great dryness of the atmosphere above the average. But this was more than compensated for by the diminished temperature of April and June.

The rainy season commenced a week earlier than in the preceding year. The rains were abundant and distributed with considerable uniformity over the whole period till the end of October. The total rainfall did not differ very greatly in amount from that of 1869. In that year by far the greater part fell in the months of July and August, whereas in 1870 there was a considerable amount registered in June and October.

The chief breaks in the rains occurred in the middle of the months of August and September and during the first three weeks of October.

The two months of November and December form part of the cool season of 1870-71. During this period the atmosphere was pleasantly cool and dry; the mean temperature was slightly below the average.

Barometer.

It is much to be regretted that meteorological observations have not been systematically registered for a sufficient number of years at the various important stations of the North-Western Provinces to supply data for determining very approximately the mean value of the various meteorological elements. When this has been done, we shall then be able, by referring to the general mathematical expressions thus obtained, to give the mean value of the atmospheric pressure, the temperature, humidity, rainfall, direction of wind, &c., for any period of the year whatever. These mean values, which represent the permanent characters of the climate, will give a fixed standard for each place, with which we may compare the fluctuating values for any portion of a given year, and thus determine what is normal and what is abnormal in its meteorology; such a comparison as this appears to be the only one which can be of much value for the purpose of establishing the connection, whatever it may be, between climate and disease.

A comparison of the mean values of the meteorological elements for a series of stations in a large province would then supply data for determining the relation between the climate and the diseases peculiar to different districts of the province; on the other hand, a comparison of the climate and meteorology of a place for any given year, and the average climate of that place as determined by the mean values of the meteorological elements, would give the relations between the climate and the spread, prevalence, and duration of abnormal diseases.

The mean atmospheric pressure was for all stations less in 1870 than in 1869. This difference averaged ·02 inch throughout the province, and was greatest in Oudh and districts to the south of it. Thus, at Agra the defect was ·07 inch, at Lucknow ·043 inch, at Bareilly ·043 inch, and at Jhansie ·032 inch. The same fact of diminished air pressure or elastic force appears from a comparison of the means for 1870 with those of the three previous years. From this comparison the air pressure diminished from north-west to south-east.

Temperature.

The mean temperature for the year 1870 was 1° less than the average for the three previous years. It was also for every month, except May and October, below the mean for the corresponding month of 1869. This decrease of temperature was most marked during the rains, and was produced by the greater humidity of 1870 as compared with previous years. The mean annual temperature was at Chukrata 59°, at Deyrah 70°, at Roorkee 75°, at Allahabad 77°, and at Benares 80°. The temperature was at Goruckpore and Lucknow 2° below the average of previous years, and at all stations with the exception of Meerut 1° less.

The mean for the first three months of the year was the same as that of the three preceding years. April was somewhat more humid than usual and 2° cooler. May, on the other hand, was relatively drier, and had a mean temperature 2° above the average. The temperature for July was 1·3°, for August 3·7°, at and for September 2° below the average. The humidity of all the months of the rainy season was in excess, the maximum occurring in the month of August. We thus see how intimate a connection there is between the temperature and humidity of any district.

The two months of November and December were also 2° cooler than the mean of previous years.

Humidity.

A characteristic feature of the meteorology of the North-West Provinces for the year 1870 was the slight deficiency of moisture (as measured by the relative humidity) during the first six months of the year, and the marked excess during the four months of the rainy season. If complete saturation of the atmosphere be represented by 100, the mean humidity of the first three months was 44, whilst the average for the same period of the three previous years was 51. During the hot months of April, May, and June it averaged 27 for 1870, as compared with 31 for preceding years.

The humidity of the atmosphere increased very rapidly about the 11th of June, and this rise was quickly followed by the commencement of the rains. The average for the whole rainy season was 68·5, or 8·5 greater than the mean for the years 1867—69. The greatest monthly mean humidity (74·5) was for August.

The means for November and December were very slightly below the average.

Amount of cloud.

The amount of cloud was for 1870 somewhat greater, especially during the rainy months, than for the preceding years 1867—69. The returns for this are unfortunately not sent in with the same regularity and accuracy as might be wished.

Rainfall.

The rainy season of 1870 was much less abnormal in its character than those of 1868 and 1869. The rains commenced about the middle of June, a week earlier than last year, and were distributed with considerable uniformity over the whole rainy season.

If the average rainfall of the year for the eleven first class observing stations in the plain of the Ganges may be taken as a rough approximation to the rainfall for the whole of the North-West Provinces—

Average for	1870	is	45·42	inches,
„	1867	„	37·60	
„	1868	„	18·90	
„	1867	„	46·50	

The rainfall of 1870 therefore approximates very closely to that of 1867 in amount.

In the north-west stations, Roorkee, Meerut, and Bareilly, the rainfall for 1870 was less than that of 1867, but greater than that of 1868 and 1869. In the southeast stations, including the province of Oude, Allahabad, and Benares, the rainfall for 1870 exceeded that of any of the three previous years 1867—69, and in the district separating the two extreme portions of the province, Agra, Futtehgurh, Jhansie, &c., it was less than that of 1867 or 1869.

Wind.

The prevailing winds in that portion of the Gangetic plain which forms the North-West Provinces are east and west, except in the north part, where they are north-west and south-east. They are thus parallel to the axis of the Himalayas, which thus exert a very powerful influence in modifying the directions of the two great atmospheric currents of Northern India. The easterly winds blow chiefly during the rainy months, and the west for the remaining eight months.

The chief exceptions to the prevailing easterly direction of the winds during the rainy months occur at Benares and Allahabad, where westerly and south-westerly winds are occasionally observed for several days, thus showing that the direct influence of the south-west monsoon reaches those places.

Ajmere is a complete exception to the above. The south-west is the prevailing wind during the greater part of the year, but more especially during the rainy months. Easterly winds are the rule during the first three months of the year.

Meteorology of the Central Provinces.

28. Dr. Townsend, the Sanitary Commissioner of the Central Provinces, thus reports on the meteorological phenomena which have come under his observation:—

Barometric pressure.

In January 1870 the barometric pressure was considerably lower both at Nágpúr and Jabalpúr than in the corresponding month of the previous year. In the following months, February to June, it was higher, the higher pressure being most marked at Jabalpúr for the five months, and in June at Seoni. The pressure was slightly lower at all three stations in July, and also in August at Nágpúr and Jabalpúr. In September there was a general rise in the pressure. In October it was higher in Jabalpúr, lower in the other two stations. In November it was generally lower, but in December there was a marked rise in the pressure compared with the previous year at all stations.

Difference of mean temperature in 1870 *compared with* 1869.

MONTHS.	Jabalpúr.	Nágpúr.	Ráipúr.
January	—1·5	—3	—4
February	—9	3	—5
March	9·5	—4	—4
April	4	—5	—5
May	—7	—2	—3
June	—1·5	—5·5	—4
July	+0·6	—2	+1
August	—3·5	—0·5	=
September	—	=	=
October	+3	+1·5	+2
November	+2	=	+3
December	—4	—5	—3

It will be observed that at all three stations, in the first half of the year, the temperatures of 1870 were very much below those of 1869; the most marked difference is seen in the temperatures of Jabalpúr, where in the month of February and March it was 9°. In ordinary seasons the mean temperatures at Jabalpúr in the early months are lower than at other stations even at higher elevations, and this is probably due to deficient drainage of the locality.

Temperature influenced by sub-soil water level.

The level of the water in the jail wells in February 1870 was 10 and 12 feet from the surface, and over a great part of the basin the sub-soil water in ordinary seasons approaches the surface much nearer even than this, but from the scanty rainfall of 1868 there was a great diminution in the average level of the sub-soil water, and in March and April 1869 wells 30 and 40 feet deep had run dry. The great diminution in the level of the sub-soil water over the whole country was probably one of the chief causes of the higher temperatures through the greater part of the year; it was not until the sub-soil water had reached its normal level towards the end of the rains of 1870 that the temperatures equalled those of the previous year.

Humidity.

The following show the difference in the mean humidity in 1870 compared with 1869 at the three stations for which the difference in the temperature was above shown:—

MONTHS.	DIFFERENCE IN RELATIVE HUMIDITY IN 1870.		
	Jabalpúr.	Nágpúr.	Ráipúr.
January	+09	+13	—01
February	+14	—01	—04
March	+07	—03	—06
April	+08	+09	+09
May	+01	—08	—02
June	+09	+06	+12
July	+01	+03	—03
August	+01	—10	0
September	+10	—12	—01
October	+10	+06	+04
November	+08	+15	+07
December...	—0·3	—06	—05

At Jabalpúr the humidity was higher in every month of the year, with the exception of December. The greatest difference is observable in the first six months of the year and in the three months following the rains. At Nágpúr during the first six months there was greater moisture of the atmosphere in January, April, and June, slightly less in the other three months. In November again there was a considerable excess of moisture at Nágpúr. At Raipúr the instruments are not so freely exposed as in the other stations. The hygrometer indicates no difference in the moisture in January 1870, compared with that of the same month in 1869; in other respects the differences are much the same as at Nágpúr.

Wind.

The general directions of the winds that blow over the province at different seasons of the year were described in my last report. The wind statistics of this province for 1870 have been tabulated by Mr. Blanford with those of Bengal in a series of charts appended to his report, and the directions at different seasons of the year are so clearly shown in them that further remark on the subject is scarcely necessary. In February, March, and April southerly winds were more frequent than in corresponding months of 1869, but in May and the early part of June north and north-westerly winds were more persistent. The south-west monsoon set in in 1870, as in the previous year, about the 18th June, and it continued the prevailing wind till the middle of September, when the north-east monsoon set in.

Rainfall.

The rainfall of 1870 was rather above the average. In the latter end of January there was a fall of rain which was abundant for the time of the year, distributed generally over the whole province; it was not much above the average over the Vindyan division and the Narbadá valley, but if the registers at Chicholi, Shahpúr, and Atner are correct, it was unusually heavy over the western portion of the Sátpúrás. At the first of these stations upwards of 8 inches were registered in the month and at each of the other two stations 6 inches. Over the plains south of the Sátpúrás also the rainfall in January was generally much above the average, very nearly 5 inches having been registered at Bhandárá. The stations near the western face of the Maikal range did not experience this fall, but it was above the average again in the Bilaspúr district, west of that range. On the 10th February nearly 2 inches were registered at Mandla, but with this exception the rainfall in February was very light. In the latter end of March and beginning of April thunderstorms were generally frequent, and at Chhindwárá, on the 22nd March, a violent hailstorm committed a considerable amount of damage to the standing corn. In May the rainfall was again below the average. In the week from 12th to the 18th June the monsoon was ushered in with violent thunderstorms occurring over the whole province, and on the 20th and 21st June the heaviest rainfall of the season was registered at the majority of the stations, particularly of those south of the Sátpúrás. From this date the rainfall, though not very heavy, was continuous almost without intermission to the end of July, so much so that in many districts the sowing of the Kharif crops was materially interfered with. In August the rainfall was generally light, but in September the fall was up to the average, and in October considerably above it. In November again there was an unusually heavy fall of rain, particularly over the districts south of the Sátpúrás.

General character of the year.

The result of the analysis of the meteorological registers for the year 1870 shows that the first four months of the year, compared with the corresponding months of the previous year, were characterized by a much lower temperature, more frequent and abundant falls of rain, and greater moisture of atmosphere. Through May and the early part of June, though the difference in temperature was almost as marked as in the preceding months, the mean humidity, as shown by the hygrometer, was rather less than in the corresponding month of the previous year, the effect of the greater persistence of the north and north-west winds, and the consequent greater infrequency of winds from the south and south-west. The south-west monsoon set in in the third week of June, and the monsoon rains were abundant. The north-east monsoon set in rather early, but the weather nevertheless continued cloudy. Through October and November the temperature was high for those months, and over the southern division of the province heavy falls of rain occurred in November, which is unusual. In December the weather cleared, and the temperature fell below that of the corresponding month of the previous year.

Meteorology of the Punjab,

29. Dr. Neil, Meteorological Reporter of the Punjab, has favored me with the following summary of the atmospherical phenomena of the year within this province:—

During the year 1870 a regular record of rainfall was registered as in previous years at the sudder stations and sub-collectorates of each district, and observations, which comprised records of barometric pressure, hygrometry, temperature, direction of wind, prevailing diseases, &c., were kept up at the following stations:—Lahore, Mooltan, Dera Ismael Khan, Peshawur, Rawul Pindee, Murree, Sealkote, Dalhousie, Loodiana, as well as at Bhawulpoor and Ladakh in foreign territory. In most of these stations the records extend throughout the whole year.

The following are the results with regard to a few of these stations compared with those of former years:—

Rainfall.

Year.	January to May.				June to Sept.				October to Dec.				Total.				
1867	5·5	2·1	9·6	8·8	13·4	3·2	11·8	38·2	1·2	1·2	0·1	...	Lahore	...	20·1	15·1	20·5	9·2
1868	8·4	4·8	8·4	12·6	6·2	0·1	12·7	29·8	0·5	0·2	2·1	0·8	Mooltan	...	6·5	5·1	13·8	2·0
1869	4·6	7·7	17·0	11·0	12·3	6·1	10·1	35·0	3·6	0·0	0·3	0·2	Rawul Pindee	...	21·5	23·3	27·4	29·0
1870	0·4	0·8	1·7	5·5	8·2	1·2	26·6	26·7	0·6	0·0	1·7	0·6	Sealkote	...	47·0	43·2	46·2	32·8
Station.	Lahore.	Mooltan.	Rawul Pindee.	Sealkote.	Lahore.	Mooltan.	Rawul Pindee.	Sealkote.	Lahore.	Mooltan.	Rawul Pindee.	Sealkote.	Year.		1867	1868	1869	1870

From the above table it will be seen that, as a general rule, to which however there are frequent local exceptions, a rainy cold season is the precursor of a partial failure of rain in the proper raining season, and *vice versâ*. This is well exemplified in the case of Rawul Pindee. In the first five months of the years 1867-68-69 the falls were considerable, whereas those of the next four months of the same years were much below the average. In 1870 matters were notably reversed. A small fall in the first five months of that year preceded a most copious fall in the proper rainy season.

Another interesting point is to be noted, *viz.*, the geographical distribution of the rain for each year. Take six stations at considerable distances from each other in point of latitude, thus:—

	Months.	1	2	3	4	5	6	7	8	9	10	11	12	Total.
		in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
1867 ...	Delhi ...	...		0·8	0·7	0·7	0·9	9·7	7·4	1·1	.	...	1·7	23·0
	Umballa ...	0·3	0	0·4	0	0·9	0·6	15·3	18·2	1·9	0·7	..	...	44·3
	Loodiana ...	0·8	0·3	0·7	1·4	2·8	1·4	4·1	7·3	0·8	...	..	...	19·6
	Goordaspore ...	0·6	0·3	1·3	...	4·8	0·1	5·4	8·9	0·8	...	...	0·4	22·6
	Goojrat ...	0·5	0·5	2·1	1·7	1·4	...	8·4	13·8	1·9	...	...	0·3	30·6
	Rawul Pindee	1·4	2·3	0·2	4·5	1·2	0·1	2·2	7·6	1·7	...	..	0·1	21·3
1868 ...	Delhi ...	1·5	1·3	0·5	0·9	0·4	2·3	1·1	0·3	0·1	...	...	...	8·1
	Umballa ...	0·2	0·9	2·3	3·9	3·6	1·0	3·9	1·1	0·9	...	...	...	19·8
	Loodiana ...	1·0	0·3	2·2	0·6	0·7	0·3	3·0	2·9	4·6	...	...	.	15·6
	Goordaspore ...	0·6	5·2	2·9	1·8	0·2	4·6	13·4	13·4	0·4	...	...	...	42·6
	Goojrat ..	1·4	3·5	3·1	3·6	0·4	5·7	10·9	1·7	0·5	...	...	0·5	31·3
	Rawul Pindee	0·6	1·1	1·3	3·6	1·8	0·1	9·1	2·6	0·9	0·3	...	1·9	23·4
1869 ...	Delhi ...	0·6	0·2	3·2	0	0	·9	6·5	2·2	8·2	1·7	0	0	23·6
	Umballa ...	3·3	0·6	3·6	0	0	0	12·4	0	8·3	0·0	.	0·1	28·3
	Loodiana ...	1·8	0·4	6·7	0	0	1·1	16·4	1·4	10·3	1·2	0	0	39·3
	Goordaspore ...	2·1	0·3	6·1	0	0	2·3	10·4	1·4	9·7	0·2	0	0	35·8
	Goojrat ..	1·7	0·7	10·3	0	0	1·2	10·5	·9	1·8	0·3	0	0·2	30·7
	Rawul Pindee	3·7	8·1	1·2	·5	0	1·0	4·9	·3	3·9	0·1	0	0·2	27·7
1870 ...	Delhi ...	..	0	2·3	·8	0	6·2	2·8	11·5	·5	0	0	·1	24·2
	Umballa ..	0	0	2·2	2·9	0	9·3	1·5	9·2	6·5	0·7	...	·0	35·3
	Loodiana ...	0·1	0·1	1·8	0	0·1	2·7	1·2	7·4	2·3	0	0	·1	19·1
	Goordaspore ...	0·8	·6	3·0	·5	·8	2·3	5·9	12·5	3·6	0·4	0	·4	30·8
	Goojrat ...		1·0	5·3	0	0	2·1	5·7	4·4	2·0	0	0	·6	21·1
	Rawul Pindee	0·1	·4	·9	0	0·3	5·1	10·0	9·9	1·6	·8	0	·9	30·0

The preceding table shows, without any very notable exception, that the more rain the southern districts receive, the less falls to the share of those more to the north. This rule would seem to hold good for the monthly amounts during the rainy season more than for the annual falls. Of all the cold months March would appear to be the most rainy. If much rain falls during this month, little or none falls during the next two. This was the case in 1869.

Delhi presents a local exception for 1870, which was not however shared by the neighbouring districts, as for example Goorgaon, Hissar, Rohtuck, and Sirsa, wherein the fall was scanty.

Winds.

During the first six months in some of the stations approximating to the great mountainous boundary to the north and east of the Province, as for example Rawul Pindee and Sealkote, easterly currents are frequent during the early part of the day, and are followed by westerly currents as the day advances. This is not the case, however, in districts more to the west. In Lahore the currents vary mostly from between the points N. W. and N. E., so also in Mooltan, still further west, the same currents prevail, but as the hot weather approaches there *is there* a more steady setting in of south-west winds than at Lahore, where the currents of May and June are generally very variable, as indeed they are, more to the east of the province, during the same months. In the North-Western Frontier, with its great mountainous boundary (the Suliman range) to the west, the prevailing currents, judging from observations recorded at Dera Ismael Khan, are for the first three months of the year northerly, varying from between the points N. E. and N. W. South-east winds commence to be more common there in April, and gain in frequency as the year advances towards, indeed, the end of September. These south-easterly currents are deflections of the south-westerly currents which prevail further to the south.

The changes of the winds to more southerly directions, as the year advances from the beginning to the end of the hot weather months, are explicable by the law which determines the phenomenon of the monsoon (south-west), and the deflections which occur from this normal direction are due to the influence of the great mountainous boundaries. In the light of this interpretation the deflection to the south-east, which is observed in the eastern districts of the Punjab, is plainly intelligible.

The following table shows the mean temperature in the shade for each month, and likewise the annual mean temperature of Lahore, Dera Ismael Khan, Rawul Pindee, and Sealkote for the past four years:—

Months.		Lahore.	Rawul Pindee.	Dera Ismael Khan.	Sealkote.	Remarks on the means of four years.
January ..	1867	53·1	48·7	53·6	67·5	Taking the mean of four years, Pindee is coolest by nearly 3°·5; Lahore comes next, but is only 2° cooler than Dera Ismael Khan or Sealkote during this month.
	1868	52·8	50·5	52·6	52·5	
	1869	55·6	52·9	55·2	74·5	
	1870	54·5	50·7	55·4	52·6	
February ...	1867	59·5	57·2	55·4	59·6	The mean in 1870 was greater at all the stations than during any of the previous years for the same month. Lahore was hottest in 1870 for this month, but the average of the four years gives the highest to Sealkote.
	1868	56·6	53·3	56·6	58·0	
	1869	59·7	54·3	58·5		
	1870	63·5	58·9	62·9	62·9	
March ..	1867	70·9	62·0	69·1	70·4	Lahore hottest, then Dera Ismael Khan, then Sealkote, the lowest mean being at Pindee. There are not quite 2° difference between the temperatures of the first three, while Pindee is more than 5° cooler than Lahore.
	1868	62·2	60·2	62·4	62·5	
	1869	66·5	58·7	63·9	62·0	
	1870	70·2	66·6	71·2	67·4	
April .	1867	78·9	72·0	78·1	76·0	Lahore hottest, then Dera Ismael Khan, then Sealkote. Pindee 6°·3 cooler than Lahore. Dera Ismael Khan hotter than Sealkote by 2°·3, and cooler than Lahore by 1°·7.
	1868	77·0	72·5	76·0	73·5	
	1869	82·2	71·1	77·2	76·0	
	1870	81·0	78·4	81·3	78·0	
May ...	1867	85·3	82·3	87·3	86·5	Lahore hottest, Pindee coolest, about 5° cooler than Lahore, and about 3°·0 cooler than the other two stations. May 1869 was hotter than the same month of the other years.
	1868	...	84·3	87·0	86·5	
	1869	95·6	89·4	92·4	94·9	
	1870	92·5	88·9	89·9	91·1	
June ...	1867	93·7	93·7	96·9	91·5	Sealkote coolest, then Pindee and Lahore, Dera Ismael Khan hottest. Sealkote seems to be always cooler during this month than the other three stations.
	1868	91·3	91·1	95·0	91·3	
	1869	98·6	92·3	94·7	90·1	
	1870	94·3	92·6	94·4	92·4	
July ...	1867	90·8	94·4	92·8	86·0	Sealkote coolest, Dera Ismael Khan hottest, 6° hotter than Sealkote, Pindee cooler than Lahore, and Lahore cooler than Dera Ismael Khan. The rains of course influence these results.
	1868	...	89·2	93·8	88·5	
	1869	91·1	89·4	93·6	88·3	
	1870	96·1	91·1	96·5	89·8	
August .	1867	87·8	87·5	90·2	85·5	Dera Ismael Khan hottest, Sealkote coolest, cooler by 10° than Dera Ismael Khan. This is on account of the greater rainfall, greater height and proximity to hills, of Sealkote.
	1868	...	89·6	92·1	89·9	
	1869	92·6	88·2	91·6	85·5	
	1870	89·7	85·5	91·6	83·9	
September..	1867	87·2	85·6	88·7	86·5	Pindee coolest, Lahore and Sealkote about the same, Dera Ismael Khan hottest. The last station is on a lower level than the other three, and its humidity is greater, and thus does not allow of great daily ranges.
	1868	...	86·5	88·5	88·0	
	1869	86·5	84·3	87·7	85·3	
	1870	83·3	82·8	88·4	82·8	
October ...	1867	76.0	72·6	73·6	77·0	Pindee coolest, about 1° difference between the other three stations. Pindee is higher above the level of the sea than the others.
	1868	78·8	74·1	77·2	78·4	
	1869	76·6	72·0	76·7	75·3	
	1870	80·5	76·2	79·4	78·7	
November ...	1867	67·6	63·5	63·5	64·0	Pindee coolest, Lahore slightly hotter than the other two stations.
	1868	67·4	63·4	66·2	65·1	
	1869	64·4	59·5	65·0	61·6	
	1870	62·6	60·2	61·8	62·2	
December ...	1867	57·3	...	53·2	54·9	Pindee coolest. There is little more than 1° of difference between each station, and the order in which they stand is Pindee, Sealkote, Dera Ismael Khan, Lahore, in point of heat.
	1868	53·6	53·7	56·5	55·6	
	1869	55·9	52·5	56·1	55·1	
	1870	55·6	53·0	56·1	52·6	

From the table of mean temperature of each station in the four years under review it will be seen how much the mean of each month differs from its predecessor, either in increase or decrease, according to the season of the year. Thus the means for the four years for each month are—

STATIONS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Lahore ...	54·0	59·8	67·2	79·8	91·1	94.4	92·7	90·1	85·6	77·9	65·5	56·1
Rawul Pindee ...	50·7	55·9	61·8	73·5	86·2	93·1	91·0	87·7	84·8	73·7	61·6	53·1
D. I. Khan ...	51·2	58·3	66·6	78·1	89·1	95·2	94·2	91·2	88·4	76·7	64·1	55·5
Sealkote ...	54·2	60·5	65·5	75·8	89·7	91·4	88·1	81·2	85·6	77·3	63·2	54·6
Mean of the four stations ...	52·2	58·6	65·2	76·8	89·0	93·5	91·5	87·5	86.1	76·4	63·6	54·8
Mean difference between each month		+ 6·4	+ 6·6	+ 11·6	+ 12·2	+ 4·5	— 2·5	— 4·0	— 1·4	— 9·7	— 12·8	— 8·8

The monthly increase of temperature from January to June is greatest in April and May, and the monthly decrease from July to December is greatest in November. January is the coldest month, and June the hottest.

The relative humidity given in the following table shows the mean approach to saturation of the air by vapour, saturation being reckoned at 100, for each month of the past four years. That of Loodiana for the past two years and five months is likewise given. From this table it will be seen that April, May, and June are the driest months. The air of the colder months being denser than during the warmer, shows a relatively higher humidity. During the rainy season, the month of August would seem to possess the highest relative humidity. The month of August 1868 was one of low relative humidity throughout the whole province, so likewise was the same month of the year following. During both months the rainfall was very small, compared with that of August 1867, or even with that of the same month of last year. Matters were reversed in September 1869; in this month there was an unusual amount of rain, and a consequent high humidity, owing mostly, no doubt, to evaporation from the earth's surface. Of all the stations in this province in which meteorological registrations have been kept, Mooltan is driest at all times and seasons. Next in point of dryness comes Rawul Pindee, if we except the low humidity of Lahore during April and May of last year. Judging from the observations recorded in Dera Ismael Khan, the humidity is greater in the North-West Frontier during the last three months of the year than elsewhere in the province, and it is this greater humidity which favors the continuance of an invasion of cholera in that part of the country, after it has mostly ceased in the more southern parts.

Humidity.

Relative Humidity.

Months and Years.		STATIONS.					
		Lahore.	Mooltan.	Dera Ismael Khan.	Rawul Pindee.	Sealkote.	Loodiana.
JANUARY ...	1867 ...	49	44	47	50	40	
	1868 ...	82	.	54	60	68	
	1869 ...	56	57	72	56	51	52
	1870 ...	46	32	44	40	38	44
Mean ...	...	58	44	54	51	49	
FEBRUARY ...	1867 ...	43	34	40	58	45	
	1868 ...	70	58	55	61	49	
	1869 ...	52	43	60	54	...	62
	1870 ...	50	26	47	40	35	45
Mean ...	...	54	40	50	54	42	
MARCH ...	1867 ...	33	30	36	37	41	
	1868 ...	58		54	48	60	
	1869 ...	59	50	57	61	61	51
	1870 ...	43	35	50	37	39	61
Mean ...	..	48	38	49	45	50	
APRIL ...	1867 ..	33	31	40	41	37	
	1868 ...	49	27	43	43	64	
	1869 ...	39	25	36	38	46	31
	1870 ...	18	16	34	27	27	39
Mean ...	...	35	25	38	37	43	

Relative Humidity,—continued.

Months and Years.		STATIONS.					
		Lahore.	Mooltan.	Dera Ismael Khan.	Rawul Pindee.	Sealkote.	Loodiana
May ...	1867 ...	30	23	28	27	31	
	1868 ...	...	...	25	25	22	
	1869 ...	22	20	29	24	26	
	1870 ...	27	16	...	19	18	
Mean ...	...	23	20	27	24	24	
June ...	1867 ...	30	19	21	23	35	
	1868 ...	..	30	33	28	42	
	1869 ..	27	22	39	29	29	29
	1870 ...	30	30	26	25	27	39
Mean ...	...	29	25	30	26	33	
July	1867 ...	50	30	44	33	60	
	1868 ...	...	37	43	40	45	
	1869 ...	49	39	44	39	57	50
	1870 ...	39	34	51	43	53	56
Mean ..	.	46	35	45	39	54	
August ...	1867 ...	60	45	53	56	73	
	1868 ..	..	38	43	41	50	49
	1869 ...	47	41	47	30	55	51
	1870 ...	53	51	56	57	62	62
Mean	...	50	44	50	46	60	54
September .	1867 ...	50	38	43	37	52	
	1868 .	..	32	44	37	42	44
	1869 ...	63	42	56	45	70	65
	1870 .	42	37	40	42	49	69
Mean ...	...	52	37	46	40	54	59
October .	1867 ...	39	37	50	.	46	
	1868 ...	29	26	29	27	36	34
	1869 ...	42	28	49	32	37	34
	1870 ...	29	31	35	31	30	41
Mean ..	...	35	30	41	30	39	36
November	1867 ...	41	36	44	44	46	
	1868 .	36	32	59	44	49	35
	1869 ..	31	31	50	34	36	29
	1870 ...	31	31	37	32	34	33
Mean .	...	35	32	47	38	41	32
December ..	1867 ...	27	50	49	...	49	
	1868 ...	46	43	60	50	48	47
	1869 ...	47	31	51	42	43	43
	1870 ...	44	43	46	43	49	41
Mean ..	...	48	42	51	46	47	44
Mean ...	...	43	34	44	40	45	

The question of concentrating all information regarding the meteorology of India is now under consideration.

30. Interesting and important as are the facts which have been recorded regarding the meteorology of 1870 in the different provinces, it must be admitted that the information is by no means so complete as could be desired. Allusion has already been made to the valuable data which might be obtained if the meteorology of India were considered as a whole, and this point has also been insisted on in former reports. But I cannot refrain from again urging the very great importance of securing this object. Until we are in a position to consider the facts regarding the distribution of disease over the whole continent of India on the one hand, and those relating to the meteorology of the year on the other, we can never hope satisfactorily to study the connection between the two. Neither disease nor atmospheric influences respect the artificial boundaries of provinces, and any enquiries into great general causes, which are limited by such boundaries, must prove altogether incomplete and inadequate to the end in view. The records of the meteorology of different portions of the country, which are now detached and considered separately, require to be taken together and investigated as a whole. Observations are also needed over large tracts from which no data are now procured. The important subject of the best means of obtaining a really complete and scientific account of the meteorology of India in each year, and also of recording its correct history from month to month, is now under the consideration of the Government.

The year was remarkable for the few cases of cholera among European troops.

31. The chief individual diseases now claim more special attention, and under this head may be included Cholera, Small-pox, Fevers, Apoplexy, Delirium tremens, Dysentery, Diarrhœa, Hepatitis, and Venereal diseases.

The remarkable absence of Cholera among the European troops has been already alluded to. Among the men only 49 cases occurred altogether, of which 21 proved fatal, the ratio of admissions and deaths having been 1·5 and ·63 per 1,000. In none of the previous ten years had the troops enjoyed such freedom from the disease. During that time the cases have varied from 2·3 per 1,000 in 1866 to 37·1 in 1861, and the deaths from 1·37 in the former year to 23·73 in the latter. As regards Cholera, therefore, the past year has been singularly favorable. The distribution of the disease both in time and place is well shewn in Table XIII. It will there be seen that the great proportion of the cases, 39 out of 49, occurred in the second group, nearly all of these again having been at Hazareebaugh and Fyzabad. The Upper Provinces almost entirely escaped. Excepting one case at Umballa, and this was not fatal, the troops in the Punjab were altogether exempted from attack.

The women and children of European regiments also suffered little from the disease.

32. Only at Hazareebaugh and Fyzabad did the disease assume an epidemic form, and the outbreaks at these stations will be presently considered in more detail. But before proceeding to relate what occurred in these places, it will be advisable to glance generally at the history of cholera among other sections of the community, the women and children belonging to European regiments, the Native Troops and prisoners, and the general population. The women in proportion suffered more than the men, the total attacks among them having equalled 5·1 and the deaths 3·69 per 1,000. The loss occurred chiefly at Fyzabad; the children were more fortunate, there having been but 9 cases in the year or 1·6 per 1,000, but all of them proved fatal.

Among Native troops also the cases were few.

33. The Native troops also preserved a remarkable immunity from cholera. In the whole force, numbering more than 53,000 men and scattered over a very wide area, there were in all but 51 cases of the disease, of which 30 were fatal. In the regular Native army, and there were none among the irregulars, the admissions into hospital from this cause equalled 1·3 per 1,000 and the deaths ·75—a striking contrast to the history of 1869, in which the cases of cholera in a similar strength were 341 and the deaths 196. Among the irregular troops, composing the Central India and Punjab Frontier Forces in 1870, not a single man was attacked. In 1869 these portions of the Native army suffered with great severity, there having been 262 attacks and 180 deaths. The geographical distribution of the cholera of 1870, as it affected the Native army, is shewn very clearly in Table XIV of the Native troop series, in which the monthly prevalence of the disease is also indicated. It will be observed that it was chiefly confined to the stations of the first group, and that even in them it nowhere assumed any great intensity.

The prisoners were generally exempt, but suffered in a few jails, especially in Behar.

34. Among the prisoners the results were not so favorable. The admissions into hospital on account of cholera (546) equalled 9·1, and the deaths (211) were in the ratio of 3·52 per 1,000. Tables X and XI of this series shew that the disease was prevalent in many of the jails of Bengal Proper, as well as in some of those of Chota Nagpore and Behar. At Jounpore there was a remarkable outbreak, to which reference will be made hereafter. In the meantime, with regard to the statistics of cholera among the prisoners, it need only be stated generally that the prevalence of the disease was confined to a limited area, and that the whole of the jail population of the Upper and Central Provinces almost without exception escaped.

Within a small area the general population suffered considerably.

35. The annexed statement shews the number of deaths from cholera which were registered in each district of the Upper Provinces during 1870, and to these have been added the statistics of Madras and Bombay.

CHOLERA OF GENERAL POPULATION OF CENTRAL AND UPPER INDIA.

Cholera deaths registered among the general population of the Bengal Presidency in 1870.

DISTRICTS.	Estimated population.	CHOLERA DEATHS REGISTERED IN EACH MONTH.												Total deaths of the year.	Death rate per 10,000.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
Eastern Districts of the N. W. Provinces.															
Ghazeepore ..	1,332,403	20	13	20	10	142	58	19	40	9	8	2	5	373	2·80
Benares	793,277	.	1	15	127	138	81	16	19	19	9	3	6	434	5·47
Mirzapore ...	1,054,413	1	63	40	92	379	319	17	8	13	...	3	2	937	8·89
Azimghur ...	1,385,872	16	31	50	18	86	133	71	84	209	409	202	2	1,311	9·46
Jounpore ...	1,015,427	.	139	52	37	58	16	22	84	119	78	73	...	678	6·68
Goruckpore ..	1,983,816	2	5	130	233	1,123	900	188	19	17	24	11	8	2,720	13·71
Bustee .	1,455,607	...	...	261	1,172	1,859	531	291	153	28	57	401	244	4,997	34·33
Allahabad .	1,303,183	6	31	22	42	15	...	10	28	18	11	4	8	190	1·43
Futtehpore	680,786	...	1	...	..	2	...	...	1	2	2	1	1	10	·15
Cawnpore ...	1,188,862	1	...	1	4	5	2	3	2	3	7	1	1	30	·25
Futtehghur ..	915,943	1	1	...	2	3	1	1	...	...	2	3	...	14	·15
Districts of Oudh.															
Sultanpore ...	930,663		71	150	189	104	72	4	12	23	44	169	121	959	10·30
Fyzabad	1,440,957	12	44	199	445	497	152	62	221	220	345	308	120	2,631	18·26
Gondah ...	1,168,462	...	54	190	1,486	670	558	168	3	26	12	27	15	3,209	27·46
Seetapore . .	931,950	...	..	...		5	6	10	208	116	279	52	...	676	7·25
Baraitch . .	774,640	1	2	8	116	252	110	2	80	3	236	70	2	894	11·54
Kheree ...	738,089	...	...	...	...	...	1	...	...	...	...		...	1	·01
Pertabghur .	936,263	...	2	..	13	4	6	...	...	...	...	...	...	25	·27
Rae Bareilly	783,246	2	.	...	8	3	3	1	...	...	...	...	.	17	·22
Barabunkee ...	874,587	...	...	...	28	62	7	5	...	.	...	...	...	102	1·17
Oonao	725,154	5	...	...	...	...	1	...	...	...	...	...	...	6	·08
Lucknow	982,278	..	.	..	10	1	...	2	1	...	...	...	...	14	·14
Hurdui . .	931,377	...	...	...	...	...	...	2	...	.	...	...	...	2	·02
Districts of the Central Provinces.															
Raepore	586,118	...	...	..	...	..	...	...	...	...	...	...	...	...	...
Belaspore . .	530,541	...	..	9	...	...	...	...	...	...	..	...	.	9	·17
Sumbulpore .	268,205	..	...	...	...	...	..	...	...	...	...	...	...	...	..
Jubbulpore .	612,864	...	...	.	...	...	1	...	...	...	...	...	...	1	·02
Seonee	421,650	2	.	...	...	...	4	.	..	..	...	...	..	6	·14
Mundla .	217,264	..	.	...	...	..	...	...	..	...	...	...	.	...	...
Nursingpore	340,356	..	...	...	...	..	...	...	...	...	...	...	...	...	...
Dumoh ..	280,554	.	.	.	.	...	...	...	..	..	...	...	...	...	...
Saugor	400,636		...	...	1	...	...	...	...	...	...	...	..	1	·02
Chindwarah	260,913	...	1	..	...	...	...	...	...	...	...	...	...	1	·04
Baitool	254,915	...	...	...	..	...	...	...	...	2	...	...	...	2	·08
Hoshungabad	427,056	...	.	..	1	..	17	16	23	1	...	...	..	58	1·36
Nimar	166,882		.	..	.	...	...	...	...	...	...	...	...	..	.
Bhundara	608,480	..	2	.	...	...	...	1	2	...	...	...	..	5	·08
Nagpore ...	558,110	...	...	...	...	...	..	...	1	1	...	...	...	2	·04
Balaghat ...	173,121	...	.	.	.	...	...	...	...	...	...	..	...	...	...
Wurdah	170,228	1	..	..	...	...	.	...	...	...	...	..	...	1	·06
Chanda . .	414,869	...		...	...	...	.	...		...	...		..	...	...
Sironcha	54,680	...	..	...	..	.	14	18	3	...	...	...	...	35	6·40
Districts of Berar.															
Akolah	357,439	1	1	...	..	1	1	1	3	2	...	1	...	11	·31
Booldanah ...	302,356	...	...	1	2	1	1	.	2	...	1	..	3	11	·36
Bassim	341,725	2	2	4	2	6	...	113	86	48	4	...	...	267	7·81
Oomraotee . . .	128,708	...	..	2	...	...	...	...	...	..	...	...	...	2	·16
Ellichpore	137,136	1	1	1	5	1	1	...	...	...	...	...	...	10	·73
Woon	249,072	...	...	...	...	...	...	1	42	50	65	34	1	202	8·12
Districts of the N. W. Provinces south of, or bordering on, the Jumna.															
Banda	724,372	...	...	18	..	56	17	...	...	...	1	...	...	92	1·27
Humeerpore	520,941	...	...	...	...	2	...	2	...	..	3	...	...	7	·13
Jaloun	405,272	...	...	...	..	1	1	...	...	...	5	1	1	9	·22
Etawa	626,444	3	...	3	1	3	3	6	...	5	4	1	1	30	·48
Jhansie	357,774	...	...	...	..	..	...	...	...	...	...	...	...	...	...
Lullutpore	248,146	..	..	...	...	...	...	...	...	...	...	...	...	...	...
Districts of the N. W. Provinces lying west of the line of 80° E. Long.															
Bareilly	1,464,199	4	3	7	7	11	74	5	18	19	37	7	5	197	1·35
Budaon	889,810	10	5	4	5	10	2	2	5	6	15	5	5	74	·83
Shahjehanpore	918,850	...	1	...	...	...	...	5	2	...	9	2	4	23	·25
Moradabad	1,095,308	18	5	12	8	22	5	15	13	25	17	4	12	156	1·42
Etah	614,351	2	5	4	5	4	5	4	13	7	4	...	3	56	·91
Mynpoorie	700,220	3	4	2	5	11	3	...	3	5	...	2	...	38	·54
Allyghur	925,538	2	3	5	8	4	6	9	7	9	12	3	...	68	·73
Bolundshuhur . .	800,481	4	...	6	3	7	6	8	3	...	8	6	1	52	·65
Agra	1,028,544	1	5	3	5	8	9	7	7	1	9	6	3	64	·62
Muttra	800,321	3	9	4	10	21	12	3	8	17	6	3	2	98	1·22
Meerut	1,199,503	6	5	14	6	12	7	13	21	8	11	13	2	118	·98
Mozuffernuggur	682,189	12	10	22	7	26	9	19	9	16	11	11	8	160	2·35
Saharunpore	866,483	1	2	17	22	19	5	7	8	9	16	3	4	113	1·30
Bijnour	690,075	1	1	2	4	3	5	2	3	14	2	3	5	45	·65
Deyrah	102,831	...	...	...	...	1	...	..	...	2	1	..	...	4	·39
Terai Pergunnahs	91,802	...	..	...	...	...	...	...	...	...	..	...	...	...	...
Kumaon	385,790	...	...	...	5	...	...	...	...	...	...	...	...	5	·13
Ghurwal	248,742	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Cholera deaths registered among the general population of the Bengal Presidency in 1870,—continued.

DISTRICTS.	Estimated population.	Cholera deaths registered in each month.												Total deaths of the year.	Death rate per 10,000.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
Punjab															
Goorgaon...	690,822	4		1	3	6	50	8	4	3	2	2	2	85	1·23
Delhi ...	608,850	...	..	...	3	5	3	1	3	..	...		...	15	·25
Rhotuk .	536,895	..	.	1	1	...	1	1	2	3	...	.		9	·17
Hissar ..	484,081	..	.	...	...	1	...	..	..	2	..	..	2	5	·10
Sirsa ...	210,705	..	.	.	...	1	1	..	1	...	1	1	2	7	·33
Kurnaul	610,927	..	2	2	2	2	2	1	1	1	1	2	.	16	·26
Umballa ...	1,008,952	1	..	1	2	2	8	2	2	3	2	2	2	27	·27
Simla ..	34,173	.		..	...	...	1	...		...	..	..	1	2	·59
Jullundur	783,020	.	..	.	...	...	1	...	...	..	.	3	4	8	·10
Loodiana .	583,445	1	2	..	...	...	1	2	3	1	2	...	...	12	·21
Hoshiarpore	938,890	1	1	.	...	1	1	2	2	3	1	..	...	12	·13
Kangra ...	744,102	2	6	1	3	6	6	6	7	14	3	5	1	63	·85
Goordaspore	906,120	3	3	...	1	10	1	1	...	1	1	1	4	26	·29
Sealkote ..	994,458	.	.	...		2	1	2	1	1	1	1	...	9	·09
Umritsur ...	882,760	2	4	2	6	...	1	6	3	...	...	...	...	24	·29
Goojrat	616,347	3	1	...	2	9	1	12	4	6	1	1	3	43	·70
Goojranwalla	550,576	4	5	1	1	2	...	...	.	...	...	..	1	14	·25
Lahore	775,551		4	4	3	3	5	1	2	3	1	4	5	38	·49
Ferozepore	533,416	...	1	.	...	1	...	1	...	1	...	1	...	5	·09
Montgomery	359,437	...	..	.	.	..	...	..	.		.	.	..	...	
Mooltan ..	459,780	.	..	...	...	...	...	.	...	..	...	...	..		.
Mozufferghur	295,547		.		...	..	...	..	...	.		..	..	...	.
Dera Ghazee Khan	308,840		..	.		...	...	..	1	..	..	...	..	1	·03
Dera Ismael Khan	394,864	1	1	..	..	1	..		1	1	2		...	7	·18
Jhung ...	348,027	.	.	...		..	..	1	..		...	.	.	1	·03
Shahpore ...	368,796	...	...	..		..	1	3	1	...	.	...	1	6	·16
Jhelum ..	500,988	1	...	..	...	...	...	.	.	1	...	1	...	3	·06
Huzara ...	387,218	2	1	..	..	..	1		1	2	..	..	1	8	·21
Rawul Pindee	699,647	..	.	...	1	...	1	1	1	1		...	.	5	·07
Peshawur ...	500,443	1	..	..	1	1	.	1	3	1	1	...	2	14	·28
Kohat ...	145,419		...		..	..	...		...	...	..	...	..	...	..
Bunnoo ...	287,547	3	..	...	1	...	...	.	..		...	..	...	4	·14

Cholera deaths registered among the general population of the Madras and Bombay Presidencies in 1870.

DISTRICTS.	Estimated population.	Cholera deaths registered in each month.												Total deaths of the year.	Death rate per 10,000.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
Madras Presidency.															
Ganjam ...	1,237,200	7	3	8	12	14	9	40	198	66	2	2	15	382	3·09
Vizagapatam	1,505,015	...	9	5	11	..	10	72	78	51	...	21	2	259	1·72
Godavery ...	1,427,472	..	...	..	72	365	3,011	6,231	3,504	668	235	186	33	13,305	93·21
Kistna .	1,296,852	...	...	12	6	..	70	566	1,129	201	62	8	..	2,054	15·84
Nellore ..	1,168,664	141	180	112	9	...	10	27	20	76	20	14	4	613	5·25
Madras ...	453,441	37	16	14	48	79	395	113	121	20	22	3	3	871	19·21
Chingleput	804,283	117	54	8	16	287	551	162	72	63	35	19	20	1,394	17·33
South Arcot	1,261,840	617	246	150	118	238	300	687	571	176	88	38	16	3,248	25·74
Trichinopoly	1,000,826	900	344	192	122	7	11	44	65	103	28	139	530	2,557	25·30
Tanjore .	1,731,703	3,708	1,119	216	218	175	392	357	176	110	45	18	50	6,584	38·02
Madura .	1,146,711	18	70	323	275	307	531	621	1,445	933	479	330	324	5,656	49·32
Tinnevelly	1,624,019	8	46	258	637	1,721	1,011	1,246	626	398	142	45	573	7,011	40·04
Kurnool ...	770,867	..	...	...	...	...	...	..	..	..	...	..	...	...	...
Cudapah ..	1,144,759	...	...	...	..	31	50	29	10	8	6	..	...	134	1·17
Bellary ..	1,304,914	...	..	.	...	...	..	.	.	.	...	..	..	...	
North Arcot	1,780,016	83	102	98	99	935	809	334	389	176	113	227	140	3,595	20·19
Salem .	1,619,233	560	413	271	215	141	206	507	521	172	69	40	310	3,524	21·76
Coimbatore	1,393,582	82	97	191	103	60	5	18	60	204	623	440	284	2,323	16·67
Neilgherry	38,142	.	...	...	...	...	...	...	...	...	..	...	.	...	..
South Canara	836,010	17	8	3	5	6	7	45	43	12	35	25	32	267	3·19
Malabar .	1,840,805	8	7	31	35	77	199	150	218	108	110	141	421	1,600	8·11
Bombay Presidency.															
Bombay	816,562	6	4	6	3	7	13	2	71	75	...	62	88	337	
Tanna ...	* . ..	...	...	...	...	...	24	15	48	24	...	43	34	188	
Colaba ...	.....	..	...	...		...	...	...	4	...	19	33	30	86	
Surat .	......	5	2	1	1	3	..	2	1	...	3	...	2	20	
Ahmedabad	.. ...	7	3	2	3	8	8	3	6	6	7	.	3	56	
Broach ...	...	..	2	.	2	2	1	1	.		...			8	
Punch Mahal	.	...	...	1	1		.	...	...	1	3	..	.	6	
Kaira ...	... .	6	7	3	3	10	6	2	1	2	9	...	.	49	
Khandeish	.....	.		...	...		.	.	...	.	..	1	15	16	
Ahmednuggur	..	5	6	3	3	3	2	3	1	2	2	9	24	63	
Nassick .	. ...	2	1	1	...	4	3	1	1	1		167	10	203	
Sholapore ...	......	6		3	1	4	1	4	1	7	31	249	28	335	
Sattara ..	. . .		..	.		6	...		.	67	252	202	45	562	
Kulladghee	.. . .	2	1	3	6	...	2	5	3	1	12	9	9	53	
Belgaum ...	.. ...	...	..	...	...	2		..	12	78	128	45	37	302	
Dharwar ..	... ..	.	1	.	.	.		..	.	...	..	...	...	1	
Canara	.... .	.			...	1	..	.	..	...	..	3	...	4	
Rutnagherry ...	.....	1	...	6	1	2	1	1	2		29	65	71	185	
Mhow Cantonment .	.....	...	. .	1	...	...	.	...	...	..	.	.		1	
Poona	. .	4	...	.	. .	...		.	...	5	38	103	47	197	
" Native Troops	....	...		...	..	.	1	...	...	..	.	...	.	1	
" Jail	.....		1	.		.	..	..	..	..	...	19		20	

* The population of each district has not been given.

General statistics of cholera throughout India in 1870, so far as ascertained.

36. The general statistics, shewing the deaths which were registered from cholera throughout the different provinces of British India in 1870, are here tabulated.

Statement showing the deaths from Cholera registered in the different Provinces in each month of 1870.

PROVINCE.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of 1870.	Total of 1869.
Bengal Proper ...	No Statistics.				...	...	2,722	2,131	573	481	353	251	6,511	Not known.
N. W. Provinces ...	117	343	723	1,847	4,031	2,270	754	567	585	784	774	328	13,123	69,542
Punjab	29	31	16	33	53	87	52	43	48	22	24	31	469	9,258
Oudh	113	184	540	2,369	3,610	1,203	607	1,158	1,276	1,722	1,826	710	15,318	23,134
Central Provinces ...	3	3	...	1	...	36	35	25	4	...	...	...	107	51,387
Berar	4	4	8	9	9	3	115	133	110	70	35	4	504	10,947
British Burmah ...	...	...	...	...	...	...	...	...	...	...	...	...	250*	1,025*
Madras Presidency ...	6,363	2,743	1,887	2,091	4,442	8,566	10,305	9,249	3,630	2,114	1,702	2,775	55,867	21,034
Bombay Presidency ...	62	25	31	25	56	68	41	158	265	586	899	463	2,679	52,365

* The Registration included only 17 Towns.

The general facts regarding the distribution of cholera in this Presidency are shown on the map.

37. The general facts regarding the distribution of cholera in 1870 are indicated on the map. It may be said generally that the disease prevailed in the eastern districts of the North-Western Provinces and adjoining portions of Oudh; these are lightly marked and colored pale-green. For the tract extending between this area and the endemic province of cholera, the districts of Chota Nagpore and portion of Behar, there are no mortuary statistics; but from the number of cases of cholera among the prisoners within these limits, and from the incidental mention of the disease among the people which is made in the jail reports, we know that the population generally were suffering from the disease. In the absence of any information, a portion of this tract has been left blank. The endemic area of cholera, as in former maps, is marked by the crossed lines and dark-green color.

Particulars of the outbreak at Hazareebaugh.

38. At Hazareebaugh, including women and children, there were 30 cases and 13 deaths among the European troops. The Medical Officer of Her Majesty's 107th Regiment—the only corps at the station—was of opinion that "the disease was imported from the south, having been directly traceable to a party of prisoners coming from Purulia on the 7th June. The wind continued to blow from the south, the prevailing wind at this season being west and north-west. Over the whole station, and extending as far as the eye could see to the south, there seemed a heavy veil. The barometer kept low." The first case occurred on the 26th June in a child, who was seized while in hospital suffering from an attack of diarrhœa. A second child of the same family, who was with his mother when attending the other child, was also seized and died the same night. The Surgeon was unable to trace these cases to any special cause. The children had not been in the bazaar or exposed to sickness of any kind. On the 5th July a man was attacked, and no explanation could be given of his seizure. On the 8th two more men were attacked, dropping cases continued to present themselves, and the inmates of the infected barracks were moved into camp, seven miles to the eastward of cantonments. "The movement into camp met with a favorable result; the party who went out to Meeroo, and on whom the disease had evidently set severely, did not have a single case after marching out of cantonments. The same happy result followed the movement into the camp, which had been formed just within the borders of cantonments; only three slight cases occurred."

The disease was prevalent in the Hazareebaugh Jail, but apparently of a mild form.

39. Particulars regarding the outbreaks which occurred in other jails will be given in the jail section of this report, but as the appearance of cholera among the European troops at Hazareebaugh has been ascribed to the arrival of a gang of infected prisoners, the evidence of the Medical Officer who was in charge of them may now be conveniently recorded. On the 7th June a gang of prisoners from the Maunbhoom Jail arrived at the Hazareebaugh Central Prison. There had been one case of cholera among them on the day previous, and two were received with symptoms of the disease. The whole gang was carefully isolated at a distance of 500 yards from the Central Jail. Out of these 49 men 29 are reported to have been affected with serous evacuations, but only one of them died. By the 15th June, that is the tenth day after the first case appeared among them, the disease had ceased. None of the attendants were attacked:—cases subsequently appeared among the other prisoners. Dr. Coates is of opinion that there was no evidence of contagion; no trace of cholera could be found in the villages through which the gang had passed. It did not appear in the Hazareebaugh bazaar till the 25th June. In the District Jail, 39 cases were reported as having occurred between the 4th July and 8th August, of which 8 only were fatal. "No hospital attendant contracted the disease; none of those sent hourly day and night to give medicines or to bring in sick men or reports got it. Again, one of the women who passed through a prolonged state of collapse, and who was largely purged and vomited, had a baby about six months old who was suckled, who slept in the same bed and

under the same clothes, and was often rolled up in the mother's cloth with which she often used to wipe her face, and which was constantly more or less wet with cholera *emesis*, and yet this baby neither got ill nor even loose in the bowels." "In no case," continues Dr. Coates, "could I find contagion to be the cause of the attack or of the spread of the disease."

Particulars of the outbreak in the cantonment of Fyzabad.

40. Including men, women and children, 22 cases and 17 deaths occurred among the European troops quartered at Fyzabad. For three years Cholera had been unusually prevalent in the district, and a week had rarely passed without some cases having been reported among the people. The number of attacks had fluctuated much; sometimes they had been numerous, at other times few, but very seldom had the weekly reports shown an entire absence of the disease. The same remark holds good of the neighbouring districts of Baraitch and Gondah. During the early months of 1870, two fairs of some importance had been held in this part of the country—one at Ajoodhia, the native city of Fyzabad, and the other at a place called Dabee-patun, in the Gondah District. Both were largely frequented, and in both Cholera appeared. At Ajoodhia the cases were said to have been few, five or six altogether, but at Dabee-Patun the fair was broken up in consequence of the sickness. The first known case of cholera in the cantonment of Fyzabad was in the person of a sepoy of the 38th Regiment who had been to the Ajoodhia fair. This fair was held on the 9th, 10th and 11th of April, and on the 13th this man was attacked and died. On the 20th a woman of the 26th Cameronians was seized, and from this date up to the 1st May there were one or more cases in this regiment nearly every day. After that date there were only three cases, one on the 10th May, one on the 8th June, and one on the 24th June. The sepoy above referred to was the only one attacked among the Native soldiers.

The Sanitary Commissioner for Oudh reported that he had found it impossible to assign any regular course to the epidemic.

41. The Sanitary Commissioner of Oudh, who was called on to enquire into the facts connected with the persistence of Cholera in the Fyzabad District, reported that the disease had been very general, and that the villages had been attacked in a manner which defied all attempts to fix any particular direction for the march of the epidemic. The country lies very low and abounds in irregular marshes; in these respects it has been considered not unlike Lower Bengal. The draining of these marshes or "jheels" is opposed by the cultivators, whose rice crop depends on abundant irrigation, and rice in these parts forms a staple article of food. The Sanitary Commissioner suggests that without interfering with the crops, the banks of these jheels might be improved and the water retained within more defined limits. In some places it appears that these marshes form a continuous chain several miles in length. Proper drainage is no doubt the great sanitary want of the district.

The experience of the current year has so far also been very favorable.

42. Having stated the main facts regarding the distribution of cholera in 1870, it may be mentioned that so far the experience of the current year has again been very favorable, especially as regards the European troops. There has been no epidemic, and the solitary attacks which have taken place have been few. The occurrence of individual cases however at Allahabad, Cawnpore, Lucknow and other places has given cause for great anxiety, lest they might prove the forerunners of an epidemic, the more vigorous manifestation of which is to be feared as the season advances. So far these fears have fortunately not been realized, but it is important that the cases which have occurred should not be lost sight of in connection with the history of any subsequent outbreak.

Dr. Bryden's memorandum gives an interesting history of the cholera of 1871, and its apparent relations to the cholera of 1870.

43. Dr. Bryden's memorandum on the cholera of the current year, up to the latest information, copy of which was submitted to the Government on the 6th of July, is of much interest; and even if the conclusions at which he has arrived should prove to be incorrect, the facts

which he records are well worthy of attention in studying any subsequent development of the disease. He regards the phenomena of the last week of May in 1871 as analogous to those of the same week in 1869 when viewed in their epidemic aspects, and considers the facts important as illustrating the passing of the shadow of an epidemic over an area.

On the 27th June he wrote as follows:—

Cholera of Chota Nagpore of June and July 1871.

In writing of the successive epidemics of cholera which have appeared over Northern and Central India, I have had occasion many times to recur to the significance of a cholera recognized in passing over the plateau of Chota Nagpore, after breaking through the limits of the province of endemic cholera. Thus, when the epidemic of the spring of 1868 showed itself, we reasoned from the fact of its appearance in this locality that a new epidemic movement had occurred. Or to go back to the epidemic preceding that of 1868, the attack on the troops at Hazareebaugh, and the immediate occupation of Behar and the valley of the Ganges in July 1866, was significant to us of the fact that a great body of cholera, the same which formed the *materies* of the epidemic of Northern India in 1867, had issued forth from the endemic area.

I wish, therefore, to call attention to the facts of 1870, shown within the same provincial area, in connection with the manifestations that may possibly occur in the present year, in accordance with parallel history.

The cholera of a new epidemic, and no portion of the invading cholera of 1868-69.

The history of cholera over Upper and Central India in 1870 teaches us clearly that the material of the epidemic of 1868-69 was dead or removed beyond our frontiers, except in the tract hemmed in by the Himalayas on the north, by the line of 80° E. Long. on the west, by the line of the Gogra on the south, and by the districts of the Benares Division on the east. The registration for districts west of this tract which shows cholera as existing, is not to be credited to the extent exhibited; and were it the case that the deaths recorded did occur, the occurrence would have no importance in the present enquiry. From the indications given by our types, we know that a few cases of cholera did occur early in 1870 in Meerut and the neighbourhood. For even among the European troops two cases of cholera were treated at Umballa and Meerut in April, and in April and May three cases were fatal to sepoys in the same districts. The occurrence of those cases, however, seems to imply merely that the epidemic of 1869 was provincially renewed to a trifling extent at the season when revitalisation was due.

Cholera of July 1870 was an invading cholera.

The significance of the cholera to which I shall now allude is, as I conclude, very different; and the phenomena to be sought for are those not of a revitalised, but of a new and moving cholera of a fresh epidemic.

Parallel in July 1868.

Hazareebaugh had no European regiment in 1868, and, therefore, I take the epidemic phenomena of 1866 to show the parallel with 1870. And I do so the more readily, because the parallel events took place in the same month, and because the area affected was, as far as my knowledge goes, nearly the same in each of these years; and also because the apparent base of departure in the endemic region in June 1870 was the same as in June 1866.

At page 189 of my original Cholera Report, I have shown how the cholera of the last week of June 1866 came down upon the jails of the Behar Provinces; and placing the jail table for 1870 beside the same table for 1866, it is impossible for us not to recognise that one and the same phenomenon was present in both years. And in the case of European troops the parallel holds precisely. The phenomena of the outbreak in Her Majesty's 107th at Hazareebaugh in July 1870 were the homologue of those shown in the case of Her Majesty's 27th in July 1866.

Relative intensity of the two epidemics.

I am not speaking of the relative intensity of the cholera of these two years. Judging from the strength of the individual outbreaks, the inference would naturally be, that the body of cholera present over the area in 1866 was much greater in volume than the body epidemically spread in July 1870, and we might conclude that the phenomena to be shown after revitalisation in 1871 would be proportionately mild in character. But I am not sure that we should be right in drawing such a conclusion; for in investigating the chances of invasion and intensity, the covering of a geographical area by an apparently weak body of cholera is not always a correct index of the trength of the outbreak which is to follow, as the events of October and November 1866 in Upper India proved.

EUROPEAN TROOPS, HAZAREEBAUGH.

Cholera Admissions.

	uly.	August.	September.	October.	Total.
1866, Her Majesty's 27th Regiment ...	5	12	2	.	19
1870, Her Majesty's 107th Regiment	18	2	. .	1	21

The case in October 1870 was a mild one; but at the same date three men of the 3rd Battalion, Rifle Brigade, at Dinapore, were seized, and all of these cases were fatal. This regiment had also two cases in July, while the Hazareebaugh regiment was affected, and the women and children suffered a month earlier, at the time when the first evidence of epidemic invasion appeared.

Geography of the cholera of July 1870, as shown by the affection of the jail population.

The result shown in the case of the jails indicates a wave of cholera extending from the Coast of the Bay of Bengal to the Ganges, and this was also precisely the indication in 1866.

In the earlier months, Cuttack, Pooree, and Midnapore were covered; and with the renewal of the strength of the spring cholera after the middle of June, the evidence of epidemic advance to the north as far as the Ganges became manifest.

Parallel of 1866 and 1868 in the same area.

JAILS, 1866.

Cholera Admissions.

	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October
Midnapore ...	21	6	...	...	13	2	...	...	...
Balasore ..	...	22	23	1	33	3	5	2	...
Cuttack ...	...	8	6	3	66	36	42	31	4
Pooree ...	...	14	...	3	3	1	1	2	2
Chyebassa ...	...	25	1	48	15	25	20	2	5
Ranchee ...	...	...	1	...	...	...	...	...	...
Hazareebaugh ...	...	...	...	1	...	130	22	1	...
Monghyr ...	...	1	...	1	...	...	11	...	...
Bhaugulpore ...	...	3	9	1	...	1	32	...	...
Gya ...	...	...	...	...	...	16	3	2	...
Patna ...	...	13	4	...	...	...	22	8	...
Deegah ...	...	2	...	4	...	13	59	...	...
Arrah ...	...	...	...	...	1	29	36	...	7
Chumparun ...	...	...	...	1	...	...	17	2	...
Mozufferpore ...	...	1	1	...	...	72	...	...	...
Chupra ...	...	...	1	2	27	47	2	...	3
Ghazeepore ...	...	...	...	...	...	...	...	...	...
Benares ...	...	...	...	...	...	...	...	...	...

JAILS, 1870.

Cholera Admissions.

		June.	July.	August.	September
Midnapore	...	8	3	1	...
Balasore ...	...	...	...	...	...
Cuttack ...	...	...	40	3	...
Pooree ...	..	1	6	1	...
Chyebassa	...	...	...	...	...
Ranchee ...	...	...	7	3	...
Hazareebaugh	...	3	50	18	...
Monghyr	...	...	...	...	...
Bhaugulpore	...	...	...	...	...
Gya ...	...	...	...	1	...
Patna ...	...	...	2	12	...
Arrah ...	...	...	...	1	...
Dehree Ghat	...	...	47	...	...
Chupra ...	...	...	...	1	...

The simultaneous appearance of cholera in all of the jails of the area means that cholera was epidemic universally within the same area at the same time.

Cholera of the endemic area in the spring of 1870.

Cholera was epidemic in the early spring in the south of the tract.

As early as January, cholera is reported from the south. With reference to a few cases which occurred in the jail, the Civil Surgeon of Midnapore writes: "Cholera prevailed in a village about two miles from the jail, and a few sporadic cases occurred in the bazaar."

The Civil Surgeon of Cuttack writes in February: "A few cases of cholera have been reported in the town and district." And again in March he writes: "Cholera is more prevalent in the town and district."

In March 260 cholera deaths were registered in the Balasore district.

Revitalisation and epidemic advance subsequent to the 20th June.

But it is the monsoon revitalisation which I have shown to occur in this area about the 20th June, which chiefly concerns us, since it was subsequent to this revitalisation that the epidemic advance to the north and west occurred. By the 24th June we have evidence of the general infection of Chota Nagpore, Hazareebaugh, Behar, and the south of the Shahabad district; and by the first week of July the cholera was epidemic. The following extracts show this universality of distribution and the culmination of the invading miasm. They are taken from the monthly reports of the jails.

Evidence of renewed vitality and epidemic advance.

In Pooree, cholera was epidemic in the end of June, and the report for July says: "Cholera has been prevalent throughout the district during the month."*

In June the Civil Surgeon of Cuttack again reports the presence of cholera, which, he says, was confined almost entirely to pilgrims passing through to Pooree. The prisoners were attacked in July. He writes: "A sharp outbreak occurred at the close of the month. The disease was present in the neighbourhood of the jail and other parts of the town."

The Civil Surgeon of Midnapore writes in July: "Cholera is epidemic among the surrounding population."

Passing westward into Chota Nagpore, we read—

Chyebassa, June.—"Although there was an outbreak of cholera in the town, the jail was free from it."

Ranchee, July.—"The month has been very unhealthy. Bowel complaints and cholera cases have been numerous. Cholera has been prevalent in the bazaar near the jail."

Hazareebaugh, June.—"Cholera has prevailed, but in sporadic cases in the neighbourhood. None in jail." The great outbreaks commenced on 5th July.

Simultaneously the cholera was epidemic over the Patna district, but we have no remarks in the Jail Return, the Civil Surgeon having died from the cholera on the 11th July.

At Dehree Ghat, on the Soane, the coolies and prisoners employed on the irrigation works were attacked, cholera first appearing on 24th June. The Civil Surgeon writes in July: "The disease has spread and is in active operation in the surrounding villages. I hear that the deaths have been very numerous, and that the inhabitants are contemplating flight."

Outbreak at the same date in the endemic area in the jail at Moorshedabad.

In seeking to connect on the cholera of the endemic area with that invading to the west, it is interesting to note that the outbreak in the Moorshedabad Jail, in which 27 cases occurred, began on the same day on which the regiment was attacked at Hazareebaugh.†

The phenomenon of the re-appearance of the cholera in this locality is also parallel as regards the date of renewal. In his annual report of the Moorshedabad Jail for 1870, Dr. White writes: "About the 15th June, the district was all but free from cholera, and the Native Doctor who was sent for the purpose of attending cholera in this district, was on the point of being sent back to Calcutta, when, on the 20th, the disease was again reported as being prevalent."‡

We know that the Beerbhoom district also was affected by cholera at the same time. The imperfect registration shows, however, a total of only 140 deaths.

In the invasion of July the dates of the jail outbreaks were as under:

Dates of jail outbreaks, showing the culmination of the invading cholera.

Pooree	July 2nd.	Dehree Ghat	July 3rd.
Cuttack	„ 23rd.	Hazareebaugh District ...	„ 15th.
Midnapore	„ 24th.	Hazareebaugh Central Prison ...	„ 21st.
Ranchee	„ 6th.	Patna	„ 25th.

Cholera of Midnapore and Purulea preceding the cholera of Hazareebaugh.

A few cases occurred in the Midnapore jail between the 10th and 17th June, marking the earliest appearance of the renewed cholera; and nearly at the same date cholera broke out in a gang of transferred prisoners marching from Purulea to Hazareebaugh. Dr. Coates, of Hazareebaugh, relates the history of this case as follows:

"Cholera first appeared in a gang of 49 transferred prisoners on the day before they arrived at Hazareebaugh, namely, on the 6th June. All were placed in a hospital built the year previous for cholera patients which had never before been occupied. The hospital is 550 yards north of the jail and is surrounded by a deep ditch. Isolation was as carefully observed as possible. No communication with other prisoners was allowed, and special men were set apart and kept with them to convey their food and attend to them. Of the 49 thus placed in rigid quarantine, two were admitted into hospital, of whom one died, and twenty-seven had serous evacuations between the 7th and 15th. The seizure lasted ten days, and affected 29 out of 49 men. None of the attendants got the disease." Dr. Coates continues:

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* In his Annual Jail Report for 1870, the Civil Surgeon of Pooree says: "Epidemic cholera appeared in the town on the 14th June and steadily increased until the 30th July. It quite disappeared by the end of August."

† In the 107th, the last death occurred on the 20th July. In the Moorshedabad Jail, the last cases occurred on the 23rd, and in the Dehree Gang on the 25th.

‡ Since writing the above, cholera has re-appeared at Moorshedabad at the same date in 1871 as in 1870, and Dr. White has fallen one of its first victims.

"The cholera originated on the march here. No trace of cholera could, however, be found in the villages through which the men passed; nor did cholera appear in the bazaar of Hazareebaugh till 25th June."*

From special reports on this cholera, I might enter on further details regarding the facts of this invasion. But my object in this memorandum is to grasp the general phenomena with reference to the anticipations to be deduced from these regarding the geography of cholera in 1871.

Meteorology accompanying the invasion of the last week of June.

It is right to state that the meteorology with which the invasion of the last week of June occurred was precisely such as was to be expected. The medical officer of Her Majesty's 107th Regiment describes it, as he observed it at Hazareebaugh, in the following sentence:—

"The wind continued to blow from the south. Over the whole of the station, and as far as the eye could see to the south, there seemed a heavy veil."

Anticipation for 1871 to be deduced from the epidemic history of 1870.

It has been suggested that I am in the habit of mistaking the law of culmination for the law of movement, although, in truth, I have weighed every appearance of cholera with reference to this very point. When in October 1866 cholera appeared in isolated cases on the northern epidemic route, I stated distinctly that this cholera was due to re-appear about 20th April in 1867. I drew no such inference from the geography of the epidemic cholera of 1870 regarding cholera in Northern India. I looked, as I was bound to look, following parallel history, for movement in October and November in the districts south of the Jumna; and as it did not occur, my statement made last year was that the onward advance of the cholera of July 1870 was due in the last week of May 1871, and that all our agencies should be set to work to determine the fact whether or not epidemic advance into the western division of the epidemic area would take place in the last week of May in 1871. Having no evidence of movement in 1870, I did not anticipate the appearance of a western cholera in April; and my assertion was that the phenomena of the cholera of the last week of May would be those of a body of cholera *in motion.*

Spring manifestation of the cholera of the same epidemic in Eastern Bengal and in the Gangetic Districts in 1871.

The presence of cholera in volume in the Behar Provinces prepared us to expect in the valley of the Ganges the manifestation of a spring cholera in 1871, having its base and origin in the cholera of July 1870.†

Deaths from Cholera registered among the general population of the Benares and Allahabad Districts in the early months of 1871.

	January.	February.	March.	April.	May.
Ghazeepore	..	1	1	59	29
Benares	2	9	28	270	108
Azimghur	3	2	1	12	31
Jounpore	2	1	5		11
Mirzapore	2	1	2	36	43
Allahabad	4	1	8	44	40
Futtehpore	1	...	3	2	3
Cawnpore	1	...		8	114

The statement given above shows the tendency of cholera to become epidemic at the season normal for this situation. The monthly report for the North-Western Provinces for May states: "Cholera threatened to become epidemic in the Benares and Cawnpore Districts, but did not so establish itself."

The Sanitary Commissioner for the North-Western Provinces forwarded the following statement on 3rd May:

"In Benares city, on 29th April, 7 died, and on 30th, 9 died."

"In Jounpore, on 28th April, 4 died, and on 30th, 1 died."

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* I have thought it worth while to give the details of this case, because in his report on the outbreak in Her Majesty's 107th Regiment, the medical officer makes the statement that the cholera was introduced into Hazareebaugh by this gang. The universality of cholera over the area affected in the week in which Her Majesty's 107th was attacked, precludes the idea that the appearance was due to human intercourse; and no link of connection between the cholera of the jail and of the city or district could be found.

† A statement compiled from information received in the Office of the Inspector General of Hospitals, Her Majesty's Indian Army, just issued, reports cholera as prevailing generally in the districts of the Behar Provinces in May and June. And on the opposite margin of the endemic basin, cholera is reported as severely epidemic in April in Dacca and Rungpore, and throughout Lower Assam—a phenomenon to be expected in accordance with past history.

"In Allahabad, on 21st April, 3 died, on 23rd, 1 died, and on 27th, 1 died.'

"Two cases have occurred in Cawnpore city."

"No mention is made of cholera anywhere north of Allahabad, except at Cawnpore."

Our indices show infection at the same date at Allahabad. On 24th April, a band boy of the 104th was attacked and died; and on 4th May two fresh cases—a man and a child—were reported in the same regiment.

The cholera of a new epidemic in the Gangetic districts.

Judging from the nearly absolute immunity which the troops in the Gangetic provinces and Oudh enjoyed during the monsoon season of 1870, we can have no hesitation in referring these cases to the cholera of a fresh invasion, and therefore we are not to expect immunity in Benares, Allahabad, Cawnpore, or Oudh in the monsoon season of 1871. And already various indications, afterwards referred to, have been given that the wave of cholera has extended up to the limits of the eastern division of the epidemic area.

The cholera of the northern epidemic highway of May 1871.

I shall now investigate the facts regarding the cholera of the epidemic highway leading to the west and into Northern India—a cholera which we expect to find new and invading in the last week of May.

It is possible that with the movement in the east of the last week of April, some cholera may have been projected far to the westward. Dr. Moore reports the appearance of a case on 27th April at Banswarrah in Rajpootana. A second case was admitted into the dispensary on 1st May, and a few attacks occurred in the town at the same date. On the 2nd May, two further cases were reported from Rajpootana, one from Deeg, the other from Koombere. Two cases, ending in recovery, were reported from Bhurtpore on the 18th and 23rd May. The registration of the Punjab shows three fatal cases at Rewaree in Goorgaon in April. This is the sum of our information up to the last week of May.

Aura of an invading cholera general in the last week of May.

A case occurring under my own observation at Simla in the last week of May (28th May), led me to conclude that the aura of a moving cholera had passed over Northern India; and, subsequently, the truth of this conclusion was confirmed by the reports from officers furnishing independent statements from different parts of the area affected.

Delhi.—Telegraphic message to Quarter Master General, dated 1st June: "One sepoy, 17th Native Infantry, died of cholera on 28th ultimo. Another taken ill on 30th, is recovering."

Bhurtpore reports cholera cases on 29th and 30th May, and 1st June.

Ajmere.—Dr. Moore writes on 6th June: "The Civil Surgeon of Ajmere mentions in a letter, received to-day, that he has had a case of cholera in the city."

Gwalior.—Cholera appeared in the Lushkur in this week.

Agra.—Dr. Pilcher writes: "The first case of cholera occurred on the 29th May at the Government Dispensary, and there could be no doubt about it."

Goorgaon.—Cholera was reported in the Goorgaon district this week.*

Importance of the recognition of this cholera as that of a new and invading epidemic.

I have very often remarked that it is not intensity that we expect in such a movement; what we want is the simple evidence of the covering of an area. And this fresh appearance of cholera, over so large and so connected an area, leaves in my mind no doubt of the fact that in this week the northern epidemic highway from Chota Nagpore to Ajmere was swept by the aura of the epidemic appearing in July 1870 over Chota Nagpore and Behar.

Cholera of the same week in the east.

In the same week cholera became epidemic in Cawnpore. A woman of the 1-14th Regiment was attacked on 30th May, and died; and in the week ending 7th June, 63 deaths were reported in the city and sudder bazaar.

Cholera of the same week on the southern epidemic highway.

In the same week, the Sanitary Commissioner for the Central Provinces reports the first appearance of cholera in the area under his observation. He writes, dating May 31st:

"I have the honor to report that during the past week or ten days reports of cases of cholera occurring in different parts of this province have become rather frequent.

"On the 17th, a man was attacked at the railway station at Jubbulpore, and died the same day.

"On the 20th, a report was received at the sudder station of Wardah that four cases of cholera, one of which proved fatal, had occurred during the previous week in a village of that district. The first case occurred on the 13th.

"On the evening of the 23rd May, a civil prisoner in the Nagpore jail was attacked with cholera and died the next day. He belonged to the city of Nagpore and had been imprisoned for debt on the previous day. Yesterday, the 30th, a criminal prisoner in the jail was attacked with cholera." *

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* On reference to the Civil Surgeon for details regarding these cases, he states that he believes them to have been cases of diarrhœa or dysentery Judging from the fact of the appearance of cholera in Delhi, Bhurtpore and Agra in the same week, we are not bound to accept this conclusion.

The *Central Provinces Gazette* for the week ending 3rd June notes cases of cholera in the city of Nagpore during the week.

Cholera of the districts south of the Jumna of the middle of June.

We have not yet the link connecting on the cholera of the west with that of the east in the last week of May; but the fact is not the less certain, and the Sanitary Commissioner for the North-Western Provinces has reported the invasion of the Futtehpore and Banda districts in the first week of June.†

Cholera very general between 16th and 20th June, owing probably to the culmination of the cholera distributed in the last week of May.

Cholera certainly gained strength about ten days since. Two cases have been reported from Agra on 16th and 17th; and cholera is said to have occurred in a village about two miles from Morar Cantonments. A telegram, dated the 18th, reports the seizure of a sepoy at Chunar. A telegram from Hazareebaugh announces the death of a woman of Her Majesty's 63rd Regiment on the 17th, and a second fatal case on 21st; and on the same date a soldier of the 104th died at Allahabad, and a Staff Sergeant at Lucknow on the 18th.

Conclusion.

The practical deduction from the facts enumerated in this rapid sketch is that the cholera of a new epidemic has covered the Gangetic provinces, and has shown its presence also in the Central Provinces and on the Northern epidemic route, and that the season is approaching when a cholera so distributed may be expected to become vigorous.

It is probably true that we may often anticipate the degree of severity of an epidemic manifestation of the monsoon season over an area by the strength or universality of the phenomena of the spring cholera, that is, by the history of the cholera of April and May. But I believe that we may often be deceived in making such an estimate, and that it is far safer to recognise merely the leading facts, and to be prepared to act on the presumption that an outbreak is to be expected at any time between July and the third week of September within the area known to be affected.

I can offer no opinion regarding the strength of manifestation to be looked for in July, August, and September.

I think it right, however, that this statement of the facts observed, and the relations of the existing cholera as I read them in the light of parallel history, should now be placed on record, in order that if cantonments become affected, the affection may not be attributed to the casual introduction of cholera.

Small-pox was little prevalent during the year.

44. Twenty-one cases of Small-pox occurred among European troops during 1870, and of these six were fatal; the ratios of admissions and deaths having been ·6 and ·18 per 1,000. These results contrast very favorably with those of 1869, when Small-pox, in common with the other chief diseases, was so rife. In that year the admissions equalled 3·8, and the deaths ·46 per 1,000. For the ten years, 1860—69, the average annual death-rate from this cause has been ·35 per 1,000. The statistics of Native troops and prisoners show a similar diminution in the prevalence of small-pox. Among the former there were 59 cases and 5 deaths, or a proportion of 1·5 and ·13 per 1,000. Among the latter, out of 75 attacks 8 proved fatal, the ratios having been 1·3 and ·14 per 1,000. The distribution of the few cases of Small-pox among Europeans is shown in Table XIV. At Meerut there were six cases; at none of the other stations did the number exceed three. The entire absence of the disease in the four months, July to November, is worthy of notice, and altogether in accordance with what has been previously observed. Neither among the women nor children of European Regiments did a single fatal case occur throughout the year. Three women and two children were attacked.

Among the general population small-pox very much less prevalent than in 1869.

45. It is interesting to compare the statistics of Small-pox among troops and prisoners with those of the general population.

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* The first cases in the Banda district were registered on 13th, 14th, and 15th June.

† The Civil Surgeon of Nagpore notes as a remarkable fact that the first case in his jail occurred simultaneously with the commencement of the great outbreak in the 18th Hussars at Secundrabad in the Deccan. The possibility of the epidemic connection between this cholera and the shadow projected over the Central Provinces in this week should not be lost sight of.

The results which have been compiled in the following statement show that compared with the terrible mortality which it occasioned among the people in 1869, Small-pox in 1870 was singularly dormant.

Statement showing the Deaths from Small-pox registered in the different Provinces in each month of 1870.

PROVINCE.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of 1870.	Total of 1869.
Bengal Proper . .	No statistics.						331	331	255	160	130	116	1,323†	Not known.
N. W. Provinces ...	1.240	1,080	2.212	2.961	5,127	3.993	2.379	1.350	894	708	521	1,099	23,564	90,770
Punjab . .	2.778	3.038	3.362	3,582	4.445	3,343	1.987	902	543	381	821	1,981	27.163	53,195
Oudh	376	437	1.003	1.459	1.556	1.445	1,300	873	741	767	618	473	11,048	21.564
Central Provinces .	161	177	319	329	278	251	250	246	127	73	69	68	2,348	16,849
Berar	30	19	77	130	305	183	215	132	140	73	28	32	1.394	6,365
British Burmah ..	..											..	188*	1,037*

Fevers which had been unusually prevalent in 1869 caused still greater sickness in 1870, the ratio of admissions having been higher than in any year since 1858.

46. The excessive prevalence of fevers within a certain portion of the country in 1870 has been already adverted to. In 1869 the troops at many stations in the third, fourth and fifth groups suffered much, and in most of them during the past year the sickness prevailed with even greater intensity. The admission rate for this one class of diseases in 1870 was 834 per 1,000, a higher ratio than that of any year since 1858. In 1858, when the troops were much exposed in the field, the admissions from this one cause equalled no less than 1,442 per 1,000, but they took place chiefly during the heat of May and June. From 1859 to 1869 the proportion fluctuated between a minimum of 462 in 1868 and a maximum of 805 in 1862.

Although the mortality from this cause has been high, it was smaller than usual in proportion to the number of cases treated.

47. One hundred and forty-three of the cases of fever in 1870 proved fatal, or a ratio of 4·28 per 1,000 of average strength. In 1858 the death rate from fevers equalled 18·57, but this high mortality has never since been even approached. In several of the intervening years, however, as shown in the table which was given in last annual report, the loss under this head has been greater than in 1870. In 1859 the ratio was 6·58; in 1860, 4·85, and in 1869, 4·71. As regards 1870, it therefore appears that while fevers have been much more prevalent than ordinary, the mortality has been smaller than usual in proportion to the number of cases.

The comparative prevalence of the disease in different stations, and its distribution by months are shown in Table XV.

48. In the tables for 1870, a special statement has been added to show the relative prevalence of fevers in different groups and stations, and also the monthly distribution of the disease. These statistics embrace many interesting details. It appears from them that the incidence of fevers was very unequal in different parts of the country. The admission rate which in Bengal Proper was only 305 per 1,000, in the second group was 358, in the third 419, in the fourth 1,209, and in the fifth 1,450. In the first of these the number of cases, although small, was slightly in excess of the proportion for 1869, but both 1869 and 1870 compare very favorably with the years 1860—68, in the first of which the ratio was as high as 773 per 1,000. Fort William, in 1870, with 418 cases per 1,000, does not show so well as either Barrackpore or Dum-Dum, in which the ratios were only 226 and 201. In the second group the results were generally favorable, but Futtehgurh, Cawnpore and Allahabad all suffered above the average. In the third group, Shajehanpore, Bareilly and Moradabad, lying immediately to the west of the line of 80°, escaped with little sickness, and the same remark applies to Muttra; but at Roorkee the epidemic prevalence of fever was marked, and it was also manifested, although in a minor degree, at both Delhi and Meerut. All the stations in the fourth group came markedly within its influence, but at Agra, Morar and Gwalior the results were less unfavorable than at the other stations. Jhansie and Jubbulpore, with 1,677 and 1,550 cases per 1,000, suffered much. In the Punjab the disease was widely spread. Umballa, Ferozepore, Mooltan and Sealkote were exceptions, but, as a rule, the European troops in this province suffered greatly. At Attock, Nowshera and Peshawur the proportion of admissions, 1,920, 2,136 and 3,067, was very high; and in estimating the numbers at the two last, it must be remembered that these returns include detachments of 131 men from the one, and 592 from the other who were temporarily transferred to the hill of Cherat, and benefited greatly by the change. November shows the greatest number of cases of fever in any one month, but in nearly all the stations which suffered severely, there was a marked increase of the disease in the month of August, as was also the case in 1869.

The effects of malarious influences are well shown in the statistics of individual regiments, and especially of the 38th Regiment.

49. A reference to Table XIX will show how individual regiments at unhealthy stations suffered from fever. The 104th Regiment at Nowshera for example, with a strength of 697 men, of whom 100 were in the hills during the hot weather and rains, had 1,141 cases of fever. In the 1-5th and the 38th Regiments at Peshawur, even with the benefits which the temporary occupation of Cherat conferred on detachments from each, there

were 2,789 cases of fever in the one and 2,177 in the other. The condition to which a body of men may be reduced by malarious influences is well illustrated by the case of the 38th Regiment. On the 9th of November 1870, the Surgeon reported that the men were thoroughly saturated with fever poison, that they were pale and debilitated, very few of them being fit for the most ordinary duty. There were then 179 actually sick, or 38 per cent. of the strength. One hundred and thirty-nine of the men were reported to have enlarged spleen. The testimony of the Commanding Officer is even more striking. On the 24th of December 1870 he writes: "At the end of last month I rejoined the regiment after an absence of 12 months. I took an early opportunity of inspecting the regiment, and must say that I could hardly have believed it possible that a body of men, such as I left the 38th Regiment twelve months since, could have in that time so changed in general appearance and physique. In fact I never saw so spiritless and thoroughly washed out a looking lot of men in my life; the officers were in a similar state. The sick return shows that there are 272 men unfit for duty, and from the information afforded me by the medical officers, I am led to believe that a similar number, if suddenly called upon for active service, would be found unfit for the emergency." The regiment continued to suffer; on the 2nd March of the current year there were 71 men in hospital and 234 convalescents, and it was considered advisable to remove them from Peshawur.

The Cherat hill has again proved of much benefit on the occasion of an epidemic at Peshawur.

50. To these results the experience of Cherat presents a striking contrast. This hill has again been used as a sanitarium in 1871 for the troops at Peshawur, and its employment for this purpose, not only in 1870, but also in previous years, when the garrison was prostrated by epidemic disease, has been attended with so much benefit that some account of it may not be uninteresting. Forming part of the spur which separates the Peshawur valley from the valley of Kohat and of the Indus, it rises to a height of 4,400 feet above the level of the sea. The general structure of the ridge is reported to consist of loose friable slate with masses of mountain limestone which present here and there veins of metamorphic sandstone. These hills are 30 miles from Peshawur, and for about 12 miles of this distance the grand trunk road is available. Between the 27th September and 2nd October 1870, 700 men were removed from Peshawur and located at Cherat. They were selected because they were weakly, and yet the sick rate among them from all causes was only from 5 to 6 per cent. Among the troops at Peshawur during the same time it was often as high as 25 per cent. Hitherto the men have lived in tents on the hill. In them the thermometer rises to 90° and 92°, but the mornings and evenings are always cool and pleasant. The water-supply is excellent, but its distance, about two miles below the ground occupied by the troops, is a drawback.

Native Troops and Prisoners also suffered much from fevers in 1870.

51. In considering the history of fevers among European soldiers in 1870, it is important to compare the results with those presented by other sections of the community. A comparison of Table XV of European troops with a similar table bearing the same number in the series for Native troops affords much interesting information. The admission rate for fevers as a whole, which was 834 per 1,000 among British soldiers, was 837 among sepoys, a proportion which is almost identical. But the details of which these general results are composed present some striking varieties. In Bengal Proper, for example, owing partly, no doubt, to the difference in the stations occupied, the admissions from fever, which equalled only 305 per 1,000 among European soldiers, were 668 among the Natives. But this marked difference is not altogether due to this cause, for at some places the sepoys suffered much where the Europeans comparatively escaped. At Fort William, for example, the European garrison had 418 cases of fever per 1,000, whereas the Natives had 1,075. At Dum-Dum and Barrackpore similar results are observable. In the second and third groups the statistics are still markedly in favor of Europeans. In the fourth group the numbers were nearly approximate. In the fifth group the Native soldiers have much the advantage. In the jails the results in every group are more favorable than among

the troops. In the Agra and Central India group, for example, the admissions from fever among prisoners were 352 per 1,000; among European troops they were 1,209, and among Native troops 1,375. In the Punjab again the ratios for each class were respectively 660, 992 and 1,450.

Fevers were very prevalent among the people in certain parts.

52. The mortuary registration gives ample evidence that Fevers were very prevalent among the people in some parts of the country during 1870. In all the provinces indeed the deaths attributed to this cause exceeded the numbers returned under the same head in the year previous.

Statement showing the Deaths from Fevers registered in the different Provinces in each month of 1870.

Province.	January.	February	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of 1870.	Total of 1869.
Bengal Proper ...	No statistics.						8,047	11,804	13,339	15,166	17,766	17,051	83,173*	Not known.
North-Western Provinces ...	14,580	11,045	12,563	12,985	17,732	13,776	13,594	19,358	27,672	65,811	66,500	47,297	322,913	246,838
Punjab ...	23,396	16,148	15,854	14,561	18,267	15,885	13,734	15,595	31,307	44,221	36,332	29,793	275,093	272,946
Oudh ...	5,784	4,970	5,769	5,939	6,422	5,264	6,338	10,176	14,876	19,404	22,402	15,472	122,816	87,795
Central Provinces ...	5,658	4,876	5,041	5,012	5,835	4,845	5,537	7,360	9,029	9,705	9,277	9,069	81,244	68,999
Berar ...	845	952	878	1,011	1,302	1,089	1,907	2,914	3,848	3,191	2,579	2,477	23,023	12,917
British Burmah ...	...	...	...	...	...	...	...	...	...	...	...	...	3,061†	2,415†

* For six months only.

† In 17 towns only.

Among European soldiers 62 deaths from Fevers are believed to have been due to Typhoid.

53. The Fevers which occurred among European soldiers have hitherto been spoken of as if they all belonged to the one great class known as malarious, and although the great mass of them were undoubtedly of this character, there is ample evidence to show that not a few were genuine cases of Enteric or Typhoid fever. These were not confined to any particular station or to any particular month. Of the total of 153 deaths from Fevers, 62 are believed to have been due to Typhoid. Hazareebaugh, Fyzabad, Lucknow, Cawnpore, Delhi, Morar, Moradabad, Ferozepore, Rawul Pindee, Peshawur and several other places which might be named all supplied cases. This general distribution of the disease is remarkable.

The deaths occurred in months as follows:—

January	0	July	5
February	4	August	5
March	6	September	5
April	6	October	4
May	18	November	0
June	4	December	5
		TOTAL ...	62

In nearly every instance those who died were young men new to the country, as shown in the following statement:—

Years of age.	No. of deaths.	Years of age.	No. of deaths.
15	1	24	3
18	3	25	6
19	7	26	3
20	6	27	2
21	8	28	4
22	8	31	1
23	8	33	2
		TOTAL ...	62

As regards Apoplexy the results of 1870 were favorable.

54. Of apoplexy 100 cases were treated during the year, and 54 deaths were due to this cause. The admissions were in the proportion of 3·0 and the deaths of 1·62 per 1,000. In 1869 the admissions were 7·6 and the deaths 3·78. For the ten years, 1860—69, the cases have averaged 4·3 per 1,000, and the deaths 2·15. The results for 1870 are therefore favorable. A special table* has also been added to show particulars regarding this disease. Of the 100 admissions, it appears that 78 took place in the four hot months, April to July. The cases were most numerous in the Punjab, and there also the proportion which proved fatal was much greater than in any other of the provinces.

As also were those as regards Dysentery and Diarrhœa.

55. Dysentery and Diarrhœa taken together contributed a ratio of 102 admissions, and from the former there were 2·07 deaths per 1,000. None of the cases of the latter proved fatal. Neither in the proportion of attacks nor in the ratio of deaths is there any marked difference in the different groups. In the Punjab the returns were the most favorable. The incidence of these affections at individual stations can be seen on reference to Table XI. During the ten years, 1860—69, the admissions have averaged 158 per 1,000. The results for 1870 under this class of diseases are therefore more favorable than they have been generally during the previous decennial period, and present a considerable improvement on those of 1869, when the cases equalled 145, and the deaths 3·55 per 1,000.

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* No. XVI.

Delirium tremens was also less prevalent and fatal in 1870 than in 1869.

56. Of Delirium tremens 186 cases were treated or 5·6, and of these 9 were fatal or ·27 per 1,000 of strength. These figures are much under those for 1869, when the number of European soldiers who suffered from this disease was 223, and the number who died from it 22, the ratio of admissions having equalled 6·4, and that of deaths ·64 per 1,000.

Hepatitis was more prevalent but less fatal than in 1869.

57. The admissions from hepatitis were 1,903 or 57 per 1,000. In the ten years, 1860—69, the rate averaged 59, but this was chiefly due to the large proportion of cases in the earlier years. The ratio for 1870 is somewhat greater than that for 1869, which in its turn compared unfavorably with the results of the years which immediately preceded it. The death rate in 1870 was 3·71, showing an improvement on 4·94, the ratio for 1869. In the first four groups there is no great variation in the mortality due to this cause; the ratios for the Punjab are below the average.

Venereal disease has prevailed in much the same proportion as in the four preceding years.

58. The results of the measures taken for the prevention of venereal disease have not been so satisfactory as might have been expected.

The following statement shows the ratio of admissions among European troops from this cause at the different stations in each of the 12 years, from 1859 to 1870, while the letter D or E in the last column indicates whether there has been any decrease or excess in the ratio during 1870 as compared with that of 1869. This table includes all the stations occupied during the past year; and of the 51, where statistics of former years are available for comparison, it appears that in 23 there has been a diminution, in 28 an increase of admissions from venereal disease. If only the 40 places be taken where lock-hospitals existed, it will be found that in 17 of them the results in 1870 are more favorable than they were in 1869; in 23 of them, on the other hand, the returns show an increased prevalence of disease. In many cantonments the ratio of admissions continued very high. The totals of this statement show that for the army, as a whole, the admission rate from this one cause was 202 per 1,000 in the past year, or slightly in excess of the ratio for any one of the previous four years. It must be admitted, therefore, that whether we examine the returns from individual cantonments or from the army as a whole, the results are not satisfactory, and the measures which were enacted for the prevention of Venereal disease have failed to produce the beneficial results which were anticipated.

Statement showing the Annual Ratio of Admissions from Venereal Disease per 1,000 of European Troops occupying each Cantonment in the Bengal Presidency in the 12 years, 1859—70.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No.	CANTONMENT.	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	Excess or decrease in 1870, as compared with 1869.
1	Fort William ..	337	456	392	353	281	417	314	232	335	250	253	196	D.
2	Dum-Dum ...	260	...	311	...	89*	141	154*	270	144*	374	138	234	E.
3	Barrackpore ...	218	347	236	163*	193	197	369	200	165	315	235	221	D.
4	Hazareebaugh ...	681	560	634	137	309	132*	206*	291	150*	317	216	172*	D.
5	Dinapore ...	604	551	528	513	502	363	303	466	263	319	342	253	D.
6	Benares ...	458	649	597	307	229	336	495	497	410	306	308	345	E.
7	Chunar ...	...	...	...	...	...	...	...	...	...	...	392	484	E.
8	Fyzabad ...	160	402	465	268	269	253	304	339	164	176	163*	531	E.
9	Lucknow ...	510	405	267	410	301	208	188	252	181	247	170	208	E.
10	Seetapore ...	338	324	426	297	295	232	408	480	167*	94*	210	282	E.
11	Futtehghur ...	...	608	486*	307	178	259	157*	131*	174	159	401	92	D.
12	Cawnpore ...	511	558	548	411	362	290	289	268*	193	260	439	441	E.
13	Allahabad ...	162	321	396	350	426	286	229	236	223	396	345	316	D.
14	Shajehanpore ...	299	317	276*	320	358	269	512	343	288*	251*	142	307*	E.

* Not occupied during the whole year; generally for periods varying from six to eleven months.

Statement showing the Annual Ratio of Admissions from Venereal Disease per 1,000 *of European Troops occupying each Cantonment in the Bengal Presidency in the* 12 *years,* 1859—70, —continued.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No.	CANTONMENT.	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	Excess or decrease in 1870, as compared with 1869.
15	Bareilly ...	387	242	510	250	327	232	162	169*	175	262	347	253	D.
16	Moradabad ...	227	501	307*	427	338	445	200	186*	200*	207*	294	236*	D.
17	Roorkee ..	...	...	376	293	192	177	213	172*	127	93	169	132	D.
18	Meerut ...	348	214	514	463	385	338	260	172	74	131	143	169	E.
19	Delhi ...	539	413	656	377	294	379	345	355	165	166	127	277	E.
20	Muttra ...	303	240	489	354	189*	353*	177	151*	186*	96	111	243	E.
21	Agra ...	376	382	437	242	191	164	179	284	317	153	192	247	E.
22	Morar ...	254	220	301	173	251	190	278	236	157	184	223	172	D.
23	Gwalior	included above.	...	217	73*	340	280	150	58	173	131	350	214	D.
24	Seepree ...	...	...	...	...	...	175*	111*	101*	114*	150*	325	246*	D.
25	Jhansie ...	...	221*	273	322	479	346	203	197	153	179	404	384	D.
26	Nowgong ...	...	...	245	310	232	150	149	88	145	270	441	244	D.
27	Saugor ...	...	482	490	617	473	399	356	245	190	166	141	193	E.
28	Jubbulpore ...	...	523	268	363	470	525	271	129	165	189	263	242	D.
29	Umballa ...	311	256	495	309	225	182	165	161	111*	92	99	150	E.
30	Jullundur ...	307	294	346	353	299*	175	99*	169*	55*	104*	167	186	E.
31	Ferozepore ...	285	210	463	333	144*	185	118	316	95*	127	154	190	E.
32	Mooltan ...	130*	229	415	359	220	111	139	105	124	192	108	83	D.
33	Dera Ismael Khan ...	...	...	...	...	...	142	90	18	9	131	50	144	E.
34	Sealkote ...	280	318	337	217	186*	157	130	104	152	112	118	170	E.
35	Umritsur ...	218	161	247	227	171	263	61*	190	195	169	188	328	E.
36	Fort Lahore ...	...	211	...	214	...	151	220	198	185	119	123	333	E.
37	Meean Meer ...	404	358	238	245	226*	244	107	150	130	150	143	198	E.
38	Rawul Pindee ...	191	196	214	318	197*	220	199	217	154	151*	134	125	D.
39	Campbellpore ...	...	...	153*	...	...	99*	303	54	54	140*	85	44*	D.
40	Attock ...	...	71*	141	397	...	158	147	331	93	234	156	92	D.
41	Nowshera ...	111*	82	115*	296	179*	171*	135	39	38*	74	92	66	D.
42	Peshawur ...	212	222	226	209	204	283	218	120	72	201	89	120	E.
	Hill Stations.													
43	Darjeeling ..	..	...	...	264	69	114	162*	120	67	76*	58	140	E.
44	Raneekhet ..	...	...	...	...	...	...	...	...	...	...	...	153*	
45	Chuckrata ...	...	...	...	...	...	...	...	...	..	...	138*	146	E.
46	Dugshaie ...	305*	121*	59*	128*	120*	122*	141*	46*	47*	55*	128*	82	D.
47	Subathoo ...	174	321*	131*	286	203	125*	153*	66*	81*	111*	178*	56*	D.
48	Jutog ..	...	...	...	...	...	...	...	...	...	...	24*	47*	E.
49	Dhurmsalla ...	...	...	...	...	...	...	...	...	...	...	...	92*	
50	Kangra ...	...	...	...	...	...	...	...	...	...	...	...	0*	
51	Chumba Hills ..	...	...	...	...	...	...	...	...	...	...	...	133*	
52	Murree Hills ...	...	...	...	...	...	...	...	...	...	...	...	57*	
	Hill Depôts.													
53	Darjeeling ...	...	...	...	...	...	229*	...	...	89*	142*	104*	157*	E.
54	Nynee Tal ...	...	...	...	...	...	301*	74*	165*	291*	290*	331*	181*	D.
55	Landour ...	...	...	...	...	...	186*	177*	144*	117*	53*	160*	163*	E.
56	Kussowlie ...	...	...	...	...	...	176*	90*	89*	94*	131*	85*	121*	E.
57	Dalhousie ...	...	...	...	...	...	...	...	...	...	...	...	100*	
58	Murree ...	...	...	...	...	...	...	79*	105*	60*	176*	105*	58*	D.
	For the Army as a whole ...	359	338	369	318	281	254	227	217	166	199	200	202	

* Not occupied during the whole year; generally for periods varying from six to eleven months.

The small amount of success of preventive measures has been due to the imperfect manner in which the rules have been administered.

59. But before concluding that this failure has been due to any defect in the arrangements recommended, it is necessary to enquire how far the rules prescribed have actually been enforced. In the circular memorandum which was issued by the Quarter Master General, No. 89, dated the 20th December 1869, and in Home Department Resolution

No. 829, dated the 11th February 1870, particular notice was directed to certain points in the administration of the rules which had not received sufficient attention, and the necessity for the strict observance of which was urged in my general review of the Lock-Hospital Reports for 1868. These orders, however, have not yet been fully acted on. Until the rules in force have had a fair and earnest trial, it is impossible to say how far they are suited to the end in view, or in what respect they require modification. It has therefore been suggested that they should remain as they are, but that the attention of all the authorities concerned, both civil and military, should be drawn to the necessity of making a much more strenuous effort to secure success than has as yet been generally attempted. The duty is one which is extremely distasteful, but unless the civil and military authorities heartily combine to take the necessary measures, little good can be effected.

The results of the last six years show a marked improvement on the previous six years.

60. A special report on the working of the Lock-Hospitals during 1870 has been submitted to the Government, and certain recommendations have been made, with a view to obtain more satisfactory results. These recommendations, however, have reference rather to a more careful administration of the rules than to any important modifications of them. While admitting that the amount of success which has hitherto attended the efforts for the repression of the evil has not been so great as might have been anticipated, it must be added that the statistics of the last six years, during which greater attention has been devoted to the subject, as may be seen from the statement just given, present a very favorable contrast with those of the six years which preceded them.

The returns from Bengal do not compare unfavorably with those of stations in the United Kingdom which are under the Contagious Diseases Act.

61. The proportion of admissions from Venereal disease in this presidency, it is further to be observed, on the whole compare favorably with those of the army in the United Kingdom. Dr. Graham Balfour's memorandum on the operation of the Contagious Diseases Act of 1866* shows the ratio of admissions per 1,000 from primary venereal sores and Gonorrhœa during the three years, 1867—69. Taking these two varieties together, comparison may be made with admissions from Venereal disease in this presidency:—

		Ratio of admissions per 1,000.			
		1867.	1868.	1869.	1870.
United Kingdom.	Stations under the Act ...	217	199	169	...
	Stations not under the Act	233	233	212	...
	Bengal Presidency ...	166	199	200	202

The comparison is not altogether fair, because the Bengal returns include secondary as well as primary affections, but, even at this disadvantage, the results shown in this presidency are considerably better than those at stations in the United Kingdom which have not been under the Act; and considering the peculiar circumstances of this country, they will bear comparision even with those of Home stations in which the Contagious Diseases Act has been in operation.

The death rates according to age are here given.

62. Having considered the main diseases which contributed to the sickness and mortality of the army in India in 1870, some more general questions connected with this statistical portion of the report claim attention. Of these one of the most important is, how far have these results been influenced by age. Unfortunately there are no statistics to show at what periods of life sickness is most prevalent, or at what ages men are most subject to different diseases, but valuable data are available with

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* *Vide* Army Medical Department Report for 1869, p. 310.

reference to the relation between mortality and age. In the annexed statement, Dr. Bryden has tabulated the data on this point regarding 1870:—

Distribution of the Strength of the Army according to age at the beginning of 1870.

(Excluding the Regiments which served in the Bengal Presidency for a few weeks only of 1870).

Total strength.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.
					11,365	
33,502	2.037	9,725	10,375	8,022	2,848	495

Deaths of 1870, *and the Death rates per* 1,000 *of the strength at the different ages.*

Causes of death.	DEATHS OF 1870.				DIED PER 1,000 OF THE STRENGTH ABOVE STATED.				COMPARISON IN PERCENTAGES.				
	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Total.
Cholera	1	6	7	7	·49	·62	·67	·61	20·50	25·95	28·03	25·52	100
Fevers	15	63	32	32	7·37	6·48	3·09	2·82	37·30	32·79	15·64	14·27	100
Heat Apoplexy	......	11	10	33	......	1·13	·96	2·90	......	22·64	19·24	58·12	100
Delirium Tremens ...	......	...	2	7	......	......	·19	·61	......	......	23·75	76·25	100
Dysentery and Diarrhœa ...	......	17	13	37	......	1·75	1·25	3·26	......	27·95	19·97	52·08	100
Hepatitis	......	22	31	66	......	2·26	2·99	5·81	......	20·43	27·04	52·53	100
Phthisis Pulmonalis ...	1	8	14	26	·49	·82	1·35	2·29	9·90	16·57	27·27	46·26	100
Heart diseases	......	...	11	38	......	......	1·06	3·34	......	......	24·09	75·91	100
All other causes	1	37	65	106	·49	3·80	6·27	9·33	2·46	19·11	31·52	46·91	100
All causes	18	164	185	352	8·84	16·86	17·83	30·97	11·87	22·63	23·93	41·57	100
All causes, excluding Cholera	17	158	178	345	8·35	16·24	17·16	30·36	11·58	22·52	23·80	42·10	100

Dr. Bryden's memorandum in Appendix C discusses the question of the relation of age to mortality, and also the effect of climatic influences on bodies of men in their first year of Indian service.

63. Dr. Bryden has prepared a memorandum on the relation of age to mortality, and in it he has also discussed the effect of climatic influences on bodies of men during their first years in India. Both of these points are of great practical importance, and Dr. Bryden's memorandum, copy of which forms Appendix C, will be found to contain much valuable and interesting information. I shall not do more than direct attention to the main facts which he has elicited, but the whole report deserves very careful study.

The mortality in regiments during their first year of Indian service has been far in excess of that of the Army generally.

64. The first question which he discusses is the extent of sickness and mortality among new regiments during their early years in India, compared with what these are in the Army generally. Taking the data of the ten years 1860—69, it appears that excluding cholera, which is a varying and therefore very disturbing element, the average annual death rate of the European troops in Bengal has been 20·74 per 1,000. Among new regiments—and these have not been selected for the purpose, but embrace all the regiments which have landed in the country during this period—the mortality in their first year of service has averaged 32·58, and in their second year 21·28; in their third year it has been only 16·32; or if cholera be included, the ratios stand thus:—

For the Army generally	29·98
For regiments in their first year of Indian service	48·10
For regiments in their second year of Indian service	24·61
For regiments in their third year of Indian service	18·41

It thus appears that whether cholera be excluded in the comparison or not, the mortality among regiments during their first year of Indian service has been very high, and far in excess of what it has been among the European force taken as a whole. The data, it is to be observed, refer only to Bengal, for the information required for the preparation of such statistics regarding Madras and Bombay has not hitherto been received in this office.

No fair comparison can be made between the sick rates of new regiments and of the Army of Bengal.

65. The amount of sickness in new regiments is not great when compared with that of the Army generally. For the European force in this presidency, during the ten years period already alluded to, the admissions into hospital annually averaged 1,754 per 1,000. Among new regiments in their first year, the ratio equalled 1,638 and in their second 1,560. The daily proportion of sick, which was 67 per 1,000 for the Army as a whole, was 64 for new regiments both in their first and second year of Indian service. But these results, although at first sight favorable to new arrivals, are not really founded on a fair comparison. Regiments on first coming to India are, so far as circumstances will admit, quartered in cantonments which have a good reputation, and are never exposed to the specially unhealthy influences of such stations as Peshawur or Morar, which tell so unfavorably on the sick rates of the British Army of Bengal.

The sickness and mortality in newly arrived regiments have been double what they were in old regiments quartered at the same station.

66. The comparison between regiments in their first year of Indian service and the Army as a whole, both as regards sickness and mortality, is moreover imperfect, because the new regiments are themselves included in the statistics from which the standard has been framed. In spite of any such advantages, which render the statistics of newly arrived corps relatively more favorable than they ought to be, the mortality in them, as we have already seen, far exceeds that of the European force in this presidency. But if a more perfect comparison be instituted, the very unfavorable results among those newly arrived are all the more apparent. Taking those stations in which regiments during their first year of Indian service have been quartered along with others who had been some time in the country, Dr. Bryden has prepared a very interesting and instructive statement. Here we have two bodies of men of much the same strength, under similar conditions as regards climate, with this difference, that the one body was exposed to these influences for

the first time, while the other had already experienced them. The results, which are very remarkable, are as follow:—

	New Troops.	Old Troops.
Admission rate	2,026·8	1,219·4
Daily sick rate	84·2	52·4
Death rate (excluding cholera) . .	43·7	13·7
Death rate from cholera	48·5	7·2

The death rate from cholera is unduly raised by the unfortunate experience of the Buffs at Meerut in 1867, and this may be regarded as an exceptional case; but even leaving cholera out of consideration altogether, the excessive sickness and mortality among the new troops are very remarkable.

Nearly one-third of all the invaliding of the last six years has been in men of less than three years' Indian service.

67. Nor is the high ratio of invaliding among British soldiers during the earliest portion of their Indian service less striking. In new regiments, during their first year in this climate, the loss from invaliding averaged 28·83 per 1,000; in the second year it was 47·75. Occurring among bodies of men in the very commencement of their Indian service, when they might be expected to be in a high state of efficiency, these losses are very heavy. But taking all recruits as well as new corps into account, the loss in their early Indian experience is even more startling, for it appears that out of 10,000 men sent home as unfit for service in this country during the six years 1865—1870, over 3,000 had been less than three years in India.

Mortality of all men should in future be shown according to length of Indian service.

68. The mortality among new regiments has been compared with that among those who have been some years in the country, and the results are strikingly unfavorable to the new arrivals. It would be of much interest and practical importance to study the influence of Indian service on the mortality of the Army as a whole, but the data necessary for the purpose are not available. The death-roll now in use does not state how long the men had served in India. It is very desirable that this defect should be remedied.

Practical importance of the fact that new regiments are subject to great sickness and mortality.

69. It may be stated then, as a fact fully proved by statistics, that new regiments contribute to sickness, mortality and invaliding in a proportion very much in excess of the ratios for those who have been a longer time in India. Whether this is to be attributed to the process of what has been termed acclimatization, or to the inexperience of new arrivals, who are less able to take care of themselves in a new country, or to the fact that the material of which these new arrivals are composed is to a great extent of an inferior quality, which rapidly succumbs to climatic influences, is a question which cannot easily be determined. But whatever may be the true explanation of the results, and probably they are more or less influenced by all these causes, there can be no doubt that the facts are of great practical importance and deserve careful consideration, not only in determining how regiments on their first landing may be best cared for, but also how far it may be expedient to garrison India with men enlisted for short periods.

There are no data to show the comparative amount of sickness at different ages.

70. An opinion has for some time prevailed among medical men in this presidency, that much of the sickness, mortality and invaliding which have occurred in the European Army have been due to the young lads who have, especially of late years, formed a large proportion of the new regiments and of the drafts of recruits. Unfortunately there are no data to shew the relative ratios of liability to disease at the different periods of life. It hardly appears to be necessary to add to the numerous returns already required from officers in medical charge of European troops any special return in order to obtain this information, but if the new forms lately designed to show the comparative ratio of admissions from upper and lower stories of barracks are generally and carefully kept, they will contain all the data desired.

The mortality and invaliding among young men have been very high.

71. As regards mortality, Dr. Bryden has shewn very clearly that the European soldier in India ages quickly, and that the losses both by death and invaliding rise rapidly and become extremely heavy at those periods of life when men are generally supposed to be at their prime. But apart from this truth, his statistics also demonstrate the very high ratio of loss from both these causes which have occurred among very young men. In the new regiments landed between 1864 and 1869, the deaths during their first year of Indian service equalled 22·51 per 1,000 in men under 20, and 40·76 in men between 20 and 24. The invaliding was 27·30 and 19·35. In the second year at these ages the deaths were 4·61 and 18· per 1,000, and the loss by invaliding 27·30 and 19·35. The fact that, during the last six years, of European soldiers under 24 years age, no less than 1,307 have died and 1,895 been invalided is well worthy of attention. How far these results have been due to the youth of the recruits, and how far to their weakly physique, cannot be shewn. In all probability both causes have had an important influence. However this may be, there can be little doubt that the recent measures which have been adopted to prevent very young lads from coming to India will have a good effect.

Statistics of age in relation to mortality and invaliding.

72. The statistics of age in relation to deaths and invaliding are shewn in the annexed statement, and the ratios at the same time compared with those of the Army in the United Kingdom.

Deaths according to Age.

(*Including Cholera*).

Years.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.
Bengal Army. 1863... ...	7·47	18·86	28·14	28·66		
1864... ...	13·89	11·33	23·49	29·75		
1865... ...	8·27	12·33	24·74	38·32		
1866... ...	4·80	11·78	18·00	27·31		
1867... ...	16·70	26·45	25·84	39·24		
1868... ..	16·45	14·72	16·24	26·38		
1869	16·73	36·61	35·11	57·15		
1870... ...	8·84	16·86	17·83	30·97		
Average of the 8 years ...	11·64	18·62	23·67	34·72		
Regiments in their first year of Indian service	22·51	40·76	56·10	67·55		
Regiments in their second year of Indian service	4·61	18·00	27·52	40·51		
Army of the United Kingdom, exclusive of Depôts, 1859—67 ...	3·08	5·79	7·70	12·34	15·88	18·40
	Invaliding.					
Bengal Army, 1865—70	25·98	26·64	39·74	78·34		
Regiments in their first year of Indian service	27·30	19·35	35·56	36·51		
Regiments in their second year of Indian service	32·28	41·74	46·16	74·49		
Regiments in their third year of Indian service	30·83	24·50	43·36	95·76		

The numbers of married and unmarried soldiers in the three presidencies.

73. The annexed statement shews the numbers of married and unmarried men of the European Army serving in the three presidencies as they stood on the 1st May 1870.

Abstract of Married and Unmarried European Non-Commissioned Officers and Soldiers serving in the three Presidencies, 1st May 1870.

CORPS.	STAFF SERGEANTS.				SERGEANTS.				RANK AND FILE.				TOTAL OF ALL GRADES.		
	Establishment in India.	Married.	Unmarried.	Percentage of married to actual strength.	Establishment in India.	Married.	Unmarried.	Percentage of married to actual strength.	Establishment in India.	Married.	Unmarried.	Percentage of married to actual strength.	Married.	Unmarried.	Percentage of married to actual strength.
Engineers.															
Bengal ..	2	2	1	66·66	25	10	27	27·02	48	13	36	26·53	25	64	28·08
Madras ...	3	2	...	100	25	17	5	77·27	154	4	11	26·66	23	16	58·97
Bombay ...	2	1	1	50	4	2	...	100	8	3	1	·75	6	2	·75
TOTAL ...	7	5	2	71·42	54	29	32	47·54	210	20	48	29·41	54	82	39·70
Artillery.															
Bengal ...	154	102	37	73·38	278	143	149	48·97	5,880	475	5,208	8·35	720	5,394	11·77
Madras ...	70	57	11	83·82	122	84	42	66·66	2,615	356	2,238	13·72	497	2,291	17·82
Bombay ...	67	51	10	83·60	108	58	50	53·70	2,338	233	2,132	9·83	342	2,192	13·49
TOTAL ...	291	210	58	78·35	508	285	241	54·18	10,833	1,064	9,578	9·99	1,559	9,877	13·63
Cavalry.															
Bengal ...	55	26	22	54·16	185	55	89	38·19	2,070	179	1,817	8·96	200	1,928	11·88
Madras ...	20	13	6	68·42	50	27	31	46·55	840	84	802	9·48	124	839	12·87
Bombay ...	28	19	4	82·60	70	47	25	65·27	826	86	825	9·54	152	854	15·10
TOTAL ...	103	58	32	64·44	305	129	145	47·07	3,736	349	3,444	9·20	536	3,621	12·89
Infantry.															
Bengal ...	288	164	82	66·66	1,312	519	670	43·65	25,958	1,911	22,552	7·81	2,594	23,304	10·01
Madras ...	72	53	22	70·66	369	146	204	41·71	7,524	618	6,598	8·56	817	6,824	10·69
Bombay ...	99	52	26	66·66	360	182	157	53·68	7,290	537	6,704	7·41	771	6,887	10·06
TOTAL ...	459	269	130	67·41	2,041	847	1,031	45·10	40,772	3,066	35,854	7·87	4,182	37,015	10·15
GRAND TOTAL OF ALL ARMS	860	542	222	70·94	2,908	1,290	1,449	47·09	55,551	4,499	48,924	8·42	6,331	50,595	11·12

It will be observed that although the proportion of married men among Staff Sergeants and Sergeants is high—70 and 47 per cent., the ratio for the rank and file is much under the number allowed, and that in the Infantry this proportion is considerably lower than in either the Artillery or Cavalry. In the Artillery the ratio for the three presidencies averages 9·99, for the Cavalry 9·20, and for the Infantry only 7·87.

Comparative sickness and mortality among the married and unmarried soldiers for the four years 1867—1870.

74. The comparative sickness and mortality among the two classes in 1870 are shown in the following Table, and side by side with the figures for that year are given the results for the three previous years.

Summary of Return for Married and Unmarried Soldiers in the Bengal Presidency in 1870, *shewing also the Parallel Statements for* 1869, 1868, *and* 1867.

(AN APPROXIMATE STATEMENT).

	Year.	Average Strength.	Total number of days spent in Hospital during the year.	Average number of days spent in Hospital by each man.	Admission rate of the year per cent. of Strength.	DETAILS OF STRENGTH ACCORDING TO AGE.						DETAILS OF DEATHS ACCORDING TO AGE.						TOTAL ADMISSIONS AND DEATHS DURING THE YEAR.		CAUSES OF ADMISSIONS AND DEATHS.															
						Under 20	20 to 24	25 to 29	30 to 34	35 to 39	40 and upwards.	Under 20	20 to 24	25 to 29	30 to 34	35 to 39	40 and upwards.			Cholera.	Fevers.	Heat Apoplexy.	Drunkenness.	Delirium Tremens.	Dysentery and Diarrhœa.	Hepatitis.	Venereal affections.	Heart disease.	Phthisis Pulmonalis.	Disease of Lungs.	Ophthalmia.	Scurvy.	Accidents and Injuries.	Suicide.	All other Causes.
Total for Married Men ...	1870	3,440	30,482	8·9	81	...	76	830	1,435	931	168	..		9	29	39	9	Admitted ...	2,776	6	1,290	9	28	33	181	118	11	29	29	126	150	...	137	1	628
																		Died ...	86	3	10	7	..	2	7	10	...	6	11	2	..	...	2	2	24
	1869	3,450	32,596	9·5	89	...	115	1,002	1,470	732	131	..	3	26	75	51	11	Admitted ...	3,078	57	1,337	38	24	46	255	114	6	33	29	112	144	...	191	...	704
																		Died ...	166	49	15	21	1	8	12	19	...	9	9	5	...	...	1	4	13
	1868	3,351	28,525	8	78	...	148	987	1,418	662	136	...	1	18	40	20	9	Admitted ...	2,613	15	523	40	106	30	202	145	15	16	17	77	158	...	181	1	787
																		Died ..	88	9	3	21	1	8	8	10	...	6	7	2	...	...	1	1	11
	1867	3,012	27,146	9	88	1	128	865	1,331	552	135	...	1	31	40	26	12	Admitted ...	2,642	64	804	19	83	19	291	97	12	32	28	107	192	4	170	1	729
																		Died ..	110	52	6	9	1	4	6	3	...	3	8	3	...	...	2	2	11
Total for Unmarried Men	1870	31,169	713,128	22·9	175	2,072	10,083	9,143	7,137	2,325	409	20	163	177	195	69	24	Admitted ...	54,535	47	26,369	71	199	154	3,153	1,776	6,426	479	304	1,660	576	22	2,702	1	10,576
																		Died ...	648	19	131	37	2	6	56	107	7	46	36	56	...	...	24	13	108
	1869	30,728	675,810	22	178	2,199	8,915	9,787	6,912	2,514	332	38	370	405	331	122	35	Admitted ...	54,694	780	23,784	203	212	182	4,697	1,650	6,341	410	339	1,418	614	25	2,826	13	11,198
																		Died ...	1,301	454	169	94	..	10	113	125	4	42	62	28	...	...	23	16	131
	1869	30,336	561,707	18·5	139	1,762	9,176	10,843	6,241	1,949	365	27	140	188	147	54	10	Admitted ...	42,158	57	13,530	221	638	107	3,443	1,465	6,064	321	223	1,395	628	23	3,021	4	10,718
																		Died ...	568	41	99	70	6	3	57	87	4	29	41	24	—	3	17	14	73
	1867	30,862	567,739	18·4	138	1,293	6,998	13,915	6,310	2,131	315	25	212	327	215	78	8	Admitted ...	42,634	551	13,670	123	572	104	3,952	1,702	5,227	351	244	1,307	736	24	2,952	11	11,149
																		Died ...	868	370	77	47	8	10	82	76	2	30	36	29	...	1	21	10	69

The results as shewn in Dr. Bryden's memo. here given are much the same as in previous years.

75. The results are clearly indicated in the following remarks by Dr. Bryden:—

The statements which follow contrast the sickness and mortality of the married as distinguished from the unmarried men of the army. The figures and ratios are shown in a parallel form for the four years 1867—70, the period for which the returns have been received from regiments and batteries. The details differ in some respects from those given in the more accurate general statistical tables; but the totals are approximate, and the ratios may be accepted as illustrating very clearly the conditions determining an excess or diminution of disease in the two classes.

As noticed on former occasions, the results shown in the return for married and unmarried men must be read in connexion with those shown in the Age Table for the year, since the ratios are to a great extent representative only of the fact that the married men are, as a body, of an age which contrasts with that of the unmarried men taken in the aggregate.

Percentage of Married and Unmarried men below and above 30 years of age.

	MARRIED MEN.				UNMARRIED MEN.			
	1867.	1868.	1869.	1870.	1867.	1868.	1869.	1870.
Above 30 years ...	68	66	68	74	28	28	32	32
Below 30 „ ...	32	34	32	26	72	72	68	68
TOTAL ...	100	100	100	100	100	100	100	100

In the Age Table it is shown that the ratio of mortality for men above 30 is consistently double of that for men below 30.

Results as regards the death rate shown in the Age Table for men below and above 30.

(EXCLUDING CHOLERA.)

Years.	BELOW 30.			ABOVE 30.		
	Strength.	Deaths.	Rate per 1,000.	Strength.	Deaths.	Rate per 1,000.
1867	25,790	318	12·33	10,857	285	26·25
1868	23,487	332	14·14	10,122	246	24·30
1869	24,511	482	19·66	11,445	435	38·01
1870	22,137	353	15·95	11,365	345	30·36

Hence, married men (the older class) give a death rate in excess of that of the younger class, the unmarried men.

Death rate in the Married and Unmarried contrasted.

Years.	UNMARRIED.			MARRIED.		
	Strength.	Deaths.	Rate per 1,000.	Strength.	Deaths.	Rate per 1,000.
1867	30,862	498	16·10	3,012	111	19·26
1868	30,336	527	17·37	3,351	79	23·58
1869	30,728	817	26·60	3,450	117	33·90
1870	31,169	629	20·18	3,440	83	24·13

The diseases peculiar to old men predominate in the case of the married, and those to which the young are more especially liable in the case of the unmarried.

Death rates of the four years in the two classes contrasted.

Causes of Deaths.	Married.				Unmarried			
	1870.	1869.	1868.	1867.	1870.	1869.	1868.	1867.
Cholera	·87	14·20	2·68	17·26	·61	15·75	1·35	11·99
Fevers	2·91	4·35	·88	1·99	4·20	5·50	3·26	2·50
Heat Apoplexy	2·03	6·09	6·27	2·99	1·19	3·06	2·31	1·52
Drunkenness	·58	2·60	·30	·33	...	...	·20	·26
Delirium tremens			2·39	1·33	·26	·33	·10	·32
Dysentery	2·03	3·48	2·39	1·99	1·80	3·68	1·88	2·66
Hepatitis	2·91	5·51	2·99	1·00	3·43	4·07	2·87	2·46
Heart diseases	1·75	2·60	1·79	1·00	1.47	1·37	·96	·96
Phthisis pulmonalis ...	3·20	2·60	2·09	2·66	1·16	2·02	1·35	1·17
Lung diseases	·58	1·45	·60	1·00	1·80	·91	·79	·94
Accident	·58	·29	·30	·66	·77	·75	·56	·68
Suicide	·58	1·16	·30	·66	·42	·52	·46	·32
All other causes	6·98	3·77	3·28	3·65	3·68	4·39	2·63	2·34
Died per 1,000	25·00	48·10	26·26	36·52	20·79	42·35	18·72	28·09
Exclusive of Cholera ...	24·13	33·90	23·58	19·26	20·18	26·60	17·37	16·10

The mortality above and below 30 in the married and unmarried was in the following proportion :—

Percentage of Deaths of Married and Unmarried Men below and above 30 years of age.

	Married Men.				Unmarried Men.			
	1867.	1868.	1869.	1870.	1867.	1868.	1869.	1870.
Above 30 years	70·91	78·41	82·53	89·54	35·02	37·50	37·51	44·44
Below 30 "	29·09	21·59	17·47	10·46	64·98	62·50	62·49	55·56
Total ..	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

Death rate of 1870 *and of the three preceding years at the same ages in the two classes contrasted. (Cholera deaths included).*

Ages.	Married.			Unmarried.		
	Strength.	Deaths.	Ratio per 1,000.	Strength.	Deaths.	Ratio per 1,000.
Under 20 years	...	...	9·93	2,072	20	16·90
" 20 " to 24 years ...	76	...		10,083	163	
" 25 " to 29 " ...	830	9		9,143	177	
" 30 " to 34 " ...	1,435	29	20·21	7,137	195	27·32
" 35 " to 39 " ...	931	39	43·68	2,325	69	34·02
40 years and upwards	168	9		409	24	

Died per 1,000, *including Cholera.*

Ages.	Married.			Unmarried.		
	1867.	1868.	1869.	1867.	1868.	1869.
Under 20 years	33·20	16·74	25·96	25·51	16·30	38·92
" 20 " to 24 years ...						
" 25 " to 29 " ...						
" 30 " to 34 " ...	30·05	28·21	51·02	34·55	23·55	47·34
" 35 " to 39 " ...	53·00	36·34	71·85	35·16	28·52	55·16
40 years and upwards						

Average of the four years.

Married men below 30 years ...	21·59	Married men above 30 years... ...	39·54
Unmarried men below 30 „ ...	24·30	Unmarried men above 30 „	34·93

For men below 30, the results are in favor of the married men, who are withdrawn in some measure from causes of mortality which operate against the unmarried soldier; but for the married men above 30, the death rate is consistently higher than that of the unmarried, the excess being due probably to the greater age of many of the married class, who have been detained in India by the fact of having been married.

Admission rates of the two classes contrasted.

Causes of Admissions.	Married.				Unmarried.			
	1870.	1869.	1868.	1867.	1870.	1869.	1868.	1867.
Cholera	·17	1·65	·45	2·12	·15	2·54	·19	1·79
Fevers	37·50	38·75	24·56	26·69	84·66	77·40	45·59	44·29
Heat Apoplexy	·26	1·10	1·19	·63	·23	·66	·73	·40
Drunkenness*	...	·64	3·17	2·75	...	·69	2·10	1·85
Delirium Tremens	·96	1·33	·89	·63	·50	·59	·35	·34
Dysentery and Diarrhœa ..	5·26	7·39	6·03	9·66	10·12	15·29	11·35	12·80
Hepatitis	3·43	3·30	4·33	3·22	5·70	5·37	4·83	5·52
Venereal diseases	·32	·18	·45	·40	20·62	20·64	19·99	16·94
Heart diseases	·85	·96	·48	1·06	1·53	1·33	1·06	1·14
Phthisis pulmonalis ...	·85	·84	·51	·93	·97	1·10	·73	·66
Diseases of Lungs	3·66	3·25	2·30	3·55	5·32	4·62	4·60	4·23
Ophthalmia	4·36	4·17	4·71	6·04	1·85	2·00	2·07	2·38
Accidents	3·98	5·25	5·43	5·64	8·67	9·20	9·97	9·56
All other causes	19·10	20·41	23·48	24·36	34·65	36·56	35·41	36·25
Admitted per cent. of strength ...	80·70	89·22	77·98	87·68	174·97	177·99	138·97	138·15

As in the return for 1869, the admission rate is double in the case of the unmarried. Excepting Apoplexy, Delirium tremens, and Ophthalmia—the former, diseases to which the older married men are specially liable, the latter, contracted probably while the children of regiments are suffering—the rates for the unmarried are consistently higher throughout the table. Fever, peculiarly the disease of the younger class, shows a ratio of 85 against 37 in the older men; bowel complaints are double, and even Hepatitis is considerably in excess among the younger men. Venereal diseases show in the unmarried a ratio of 20·62, which contrasts with a ratio of ·32 in the case of the married.

Number of Married and Unmarried men daily sick contrasted.

Years.	Married.			Unmarried.		
	Strength.	Number of days spent in hospital.	Number of days per man.	Strength.	Number of days spent in hospital.	Number of days per man.
1867	3,012	27,146	9	30,862	567,739	18·4
1868	3,351	26,825	8	30,336	561,707	18·5
1869	3,450	32,596	9·5	30,728	675,810	22·
1870	3,440	30,482	8·9	31,169	713,128	22·9

In 1870 the married men spent each less than nine days in hospital, while the unmarried passed on the average nearly twenty-three days in hospital. For the unmarried the daily sick rate is higher than in any of the other years shown above, and there has been no corresponding increase in the sickness of the married class. For the army as a body, the daily sick rate per 1,000 of 1870 was 64, as compared with 59 in 1869—a very unhealthy year—and this increase is represented in the above table by the additional day passed in hospital by each unmarried man.

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* Not recognized under the recently introduced nomenclature as a cause of admission into hospital.—See note at the end of Table XIX, European Troops.

The returns shewing the extent of temperate and intemperate habits in different regiments are all the more valuable, because under the new nomenclature drunkenness is no longer recognized as a cause of admission into hospital.

76. The returns to illustrate the extent of intemperance in the army during the year 1870 have been prepared in a simple form. It appears that in the whole of the European force in the Bengal Presidency there were 726 total abstainers, in Madras 180, and in Bombay 106. The average consumption of malt liquor and spirits drawn from the canteen did not vary much in different corps, but there are great contrasts in the "number of cases of drunkenness reported during the year" in different regiments. Among the Cavalry in Bengal the numbers varied from 74 in one regiment to 313 in another, in the batteries of Artillery from 14 to 87, and in the Infantry regiments from 42 to as many as 568. Throughout the Bengal Presidency, excluding three regiments which left without furnishing returns, the total number of cases of drunkenness amounted to 12,348. The results for Madras, in proportion to the strength, are even more unfavorable. In one regiment of foot the number was no less than 798. In the Bombay Presidency the cases of drunkenness amounted to 3,902, and the returns of the regiments generally are more favorable than in the regiments either of Bengal or Madras. Under the new nomenclature of disease which has been adopted, drunkenness is no longer recognized as a cause of admission into hospital, and the information which these tables contain regarding the temperate and intemperate habits of British soldiers in India is therefore all the more valuable, for it cannot be doubted that intemperance exercises a very baneful influence on the health of the army.

The ratio of loss by invaliding in 1870 was high—52·50 per 1,000.

77. The particulars of the loss of the army by invaliding in 1870 are given in the one side of Table XVII, and the details for each cause as it affected individual regiments are shown in No. XIX. It appears that during the year 1,693 men were invalided, of whom 270 were recommended for discharge, and 1,423 sent home for change of climate. The loss on both accounts taken together equalled 52·50 per 1,000—a high ratio compared with that of former years. Of this total, general debility caused 11·04, Hepatitis 8·06, Fevers 4·84, Phthisis 3·72, Rheumatism 3·56, Heart disease and Aneurism 3·47, and secondary Syphilis 3·04. Other causes contributed in a minor proportion. The ratio of loss from invaliding in different regiments varied from 10·20 in the 1st Battalion of the 17th, newly arrived from England, to 113·76 in the 36th Regiment and 164·38 in a battery of Artillery at Delhi.

The loss by invaliding has for some years been steadily increasing.

78. Attention has lately been drawn to the great increase of invaliding among European troops in India, and the subject is of so great importance in every point of view, that the facts deserve the most attentive consideration. In 1860 the loss on this account equalled 44·09 per 1,000, but this year for several reasons was exceptional. It immediately followed a season when the troops had been greatly exposed in the field, and it was also unusually sickly. The returns, moreover, were then not so trustworthy as regards invaliding as they have since been. From 1861 to 1870, however, presents a period of ten years, the statistics of which are quite reliable, and the particulars regarding these years are of great importance. In the first of them (1861) the ratio of invaliding was 28·09 per 1,000, and it gradually rose till 1866, when it was 49·04; in 1867 and 1868 it fell slightly—to 47·28 and 45·58 per 1,000. In 1869 it reached a maximum of 53·98, and in 1870 it was nearly as high (52·50). It may thus be stated generally that, so far as the European troops in this Presidency are concerned, the ratio of loss from invaliding has gradually risen during the last ten years from 28 to 53 per 1,000.

This increase has been due to the large number of men sent home for change of climate.

79. But an examination of the details of which these ratios are composed, shows that this marked increase is due entirely to the large number of men who have been sent home of late years for change of climate. In 1861 the proportion under this head was only 15·14 per 1,000, but it has risen each year

steadily, and without intermission, until in 1870 it equalled 44·13. It is also a noteworthy fact that the proportion of men invalided for discharge, instead of increasing, has materially decreased, and last year amounted to only 8·37 per 1,000, compared with a previous minimum of 12·95 in 1861 and a maximum of 17·37 in 1866, within the ten-year period already alluded to. These facts are clearly shown in the annexed statement which Dr. Bryden has prepared, and in which the year 1860 is included for convenient reference, although, for the reasons already given, the figures in regard to it are not of the same value as those of the ten years following :—

Statement showing particulars regarding invaliding among European Troops in the Bengal Presidency from 1860 *to* 1870.

YEARS.	Number invalided for discharge.	Ratio of invalided for discharge per 1,000 of average strength.	Invalided for change of climate.	Ratio of invalided for change of climate per 1,000 of average strength.	Total number invalided.	Total ratio of invaliding per 1,000 of average strength.
1860	1,364	27·89	792	16·20	2,156	44·09
1861	581	12·95	679	15·14	1,260	28·09
1862	572	13·31	782	18·19	1,354	31·50
1863	600	14·51	846	20·46	1,446	34·97
1864	577	14·29	907	22·46	1 484	36·75
1865	639	17·18	1,105	29·69	1,744	46·87
1866	608	17·37	1,109	31·67	1,717	49·04
1867	546	15·78	1,090	31·50	1,636	47·28
1868	421	13·66	984	31·92	1,405	45·58
1869	503	15·09	1,297	38·89	1,800	53·98
1870	270	8·37	1,423	44·13	1,693	52·50

These results are remarkable, and their import is even more clearly appreciable from the annexed statement, in which the relative proportion of men annually invalided for discharge, and of those invalided for change of climate in every 100 invalids, is stated :—

Statement showing the relative proportion of men among European Troops in the Bengal Presidency invalided for discharge, and of those invalided for change of climate in every 100 *invalids, from* 1860 *to* 1870.

YEARS.	For discharge.	For change.	Total.
1860	63·27	36·73 =	100·00
1861	46·11	53·89 =	100·00
1862	42·25	57·75 =	100·00
1863	41·49	58·51 =	100·00
1864	38·88	61·12 =	100·00
1865	36·64	63·36 =	100·00
1866	35·41	64·59 =	100·00
1867	33·38	66·62 =	100·00
1868	29·96	70·04 =	100·00
1869	27·94	72·06 =	100·00
1870	15·95	84·05 =	100·00

In 1860 the number of men invalided for discharge was much higher than that of those sent only for change, or in the proportion of 63·27 to 36·73; but leaving this year out of the question, it appears that the proportion of men sent for change out of every 100 invalids has steadily risen from 53·89 in 1861 to 84·05 in 1870; while at the same time the proportion of those sent home for discharge has fallen from 46·11 to 15·95.

It is of great importance to trace what becomes of the men who are invalided from India.

80. These statistics merely represent the recommendations of the medical authorities in India, and do not show how the men are finally disposed of. Not a few die on the passage home, but no record is received in this country to show these casualties or the number finally discharged the service. In 1869, in a letter to the Adjutant General of the Army, I pointed out the importance of obtaining precise information on these two points. The matter was referred to the Director General of the British

Medical Department, who replied that details regarding the causes of deaths among invalids after leaving India are already given; and, with reference to the suggestion that the number of invalids discharged at Netley should be shown separately for each Presidency, remarked that this had been done in the earlier volumes of the Medical Department Reports, but that owing to the interchange of regiments and the mixing of invalids at some of the depôts, such as Kurrachee, it had been found impossible to make the separation accurately, and so it was deemed better to state the discharges at Netley from India generally, than to put forward statistics the accuracy of which is more than doubtful. I would observe, however, that there is little use in attempting to trace the cause of invaliding to particular stations, if no record is preserved to show the final disposal of the men, even from each Presidency separately. To be complete, it should be shown what became of the men from each station; indeed, without such data it will be impossible to compare the influence of different cantonments as to the extent of invaliding attributed to them with any fairness, for it is quite evident that men who are sent home merely for change are not in the same category, nor do they represent the same loss to the State as those who are discharged from the service.

Measures proposed to obtain the information.

81. It is very important that the Government should have much fuller information on all these questions than is now available. If the data are only procured, the results can easily be tabulated in the Statistical Branch of this office, and the information so obtained would prove of the greatest value. If each invalid were furnished with a statement of his name, age, service, cause and date of invaliding, with any other details required, and if this statement were returned to India with a note showing whether he died, or was discharged, or had rejoined for further service, the desired end would be obtained. At present the information on these most important questions is very imperfect.

During the last few years some of the men invalided for change have returned to India.

82. The gain and loss statements for recent years show that a number of the men invalided for change of climate have returned to India. Since 1865 the numbers have been—

1865	116
1866	46
1867	20
1868	169
1869	288
1870	219

The invaliding of the year thus represents to a considerable extent only a temporary loss, but it is of great consequence to ascertain how far it is only temporary, and to what extent it is permanent.

The increase in the number sent home for change may be due to the lower estimation in which hill stations are now held.

83. The large increase in the proportion of men sent home for change of late years may, in some measure, I believe, be due to the impression which appears to prevail among the medical authorities that the hill climate, although most valuable as a means of preserving health, can do but little to cure disease. Without a very careful examination of the facts on which such an impression rests, I would not venture to offer any positive opinion on the subject; but I am inclined to think that the tendency of the present day is to under-value the hill climate as a curative agent, and I am persuaded that there are many cases of illness in which a residence in the hills, especially during the cold season, is of the greatest value in restoring health.

Valuable information might be obtained from the annual gain and loss statements if the particulars regarding invalids were given as desired.

84. In order that the information regarding invaliding may be complete, it is essential not only that full particulars should be supplied regarding the history of the men after leaving India, the deaths on the voyage or at Netley, the number who are actually discharged the service, and the number who rejoin their regiments, but also that full details

should be given regarding the cause of invaliding in this country, and the place to which it may be properly ascribed. The War Office Returns do not shew the locality in which the disablement was contracted, but in the "Gain and Loss Statement" which was devised in 1865, and which has since been annually furnished by each regiment in this Presidency, a column was specially added to show, in the case of every man invalided either for discharge or change, at what station and in what year the disease or other disability was contracted. Had this column, in all cases, been fully and carefully filled up, much valuable information might have been obtained; but although many of the statements are complete, the want of the required data, in some cases, renders it impossible to make any general tables, which would show the relative proportion of the total invaliding of each year which ought properly to be ascribed to particular stations. It is often extremely difficult to trace disease to the locality where it originated, and it is evident that unless very searching enquiries are made in each case before an opinion is given on this point, the results will be extremely incorrect. The careful preparation of the roll of invalids in the annual "Gain and Loss Statement" is a matter of much importance.

The ratio of loss from invaliding in India must be taken in connection with the loss from the same cause in the United Kingdom.

85. In considering the loss to the Army in India which is yearly due to invaliding, it must be remembered that the ratio of loss among the men serving in the United Kingdom from this cause is also heavy. In 1869 the number of invalids discharged the service from the troops serving at Home equalled 35·87 per 1,000; the proportion during the preceding nine years—1860 to 1868—averaged 33·86. During the ten years 1861 to 1870, the loss from invaliding in Bengal has equalled 41·86, including those who have been sent to England for change of climate. The Home statistics include depôt battalions, and in them the proportion of invaliding has naturally been higher than in the service generally. In 1869 it was 46·88, and the average for the nine years equals 39·42.

The total loss by death and invaliding in 1870 amounted to 74·40 per 1,000.

86. Including deaths and invaliding, the total loss of the Army in this Presidency during 1870 amounted to 74·40 per 1,000. In 1869 the ratio was 96·87, and this was the highest ratio in any previous year regarding which complete statistics are available, excepting 1858, when, from exceptional circumstances, the loss from the two taken together aggregated 144·14 per 1,000.

The sickness and mortality in different stations are compared in Tables XI and XII.

87. A comparison of the sickness and mortality in individual stations can be made by examining the contents of Tables XI and XII. The relative amount of sickness is chiefly influenced by two great causes—Fevers and Venereal diseases, and these have already received special consideration. Omitting the hills, Muttra shews the lowest death rate, 5·60 per 1,000. Three other stations in the plains—Seetapore, Shajehanpore, and Roorkee—give a ratio under 10 per 1,000. Omitting the small garrison of Chunar, where 4 deaths equal a ratio of 62·50 per 1,000, the greatest mortality was 39·87 at Jubbulpore, where there were 25 deaths out of a strength of 627.

The statistics of individual corps are given in Table XIX.

88. Table XIX is devoted to the statistics of individual corps, arranged according to the groups to which they belong. Judged by the admissions, the healthiest body of men was the 3rd Battery of the 24th Brigade of Artillery at Lucknow, where the ratio was only 557 per 1,000. Strange to say, one of the most unhealthy was the C Battery, F Brigade, at the same station, in which the admissions equalled 2,295 per 1,000. The F Battery, 19th Brigade at Agra had even a higher ratio, 2,700, but these are far exceeded by the returns of regiments and batteries in the Punjab, in which the cases of sickness equalled 2,976 at Rawul Pindee and 3,930 at Peshawur. The 11th Hussars at Muttra show the lowest mortality, 5·03 per 1000; the highest, 54·26, was in the D Battery, A Brigade, Royal Horse Artillery at Peshawur. The two newly arrived corps, the

1st Battalion of the 17th at Lucknow and the 39th Regiment at Ferozepore, had a high ratio of mortality, 35·71 in the one and 31·29 in the other.

Average number of days spent in hospital by the men of each regiment.

89. To the series of statistics for 1870, a very interesting and important Table (No. XX) has been added, in order to show the average number of days spent in hospital by the men of each regiment throughout the Presidency—an excellent test both of the extent and severity of sickness. The proportion varies from a minimum of 10·5 in Her Majesty's 107th Regiment at Hazareebaugh, and it is remarkable that the account of this station is very much more favorable than that of any other in the plains, to a maximum of 39·6 in one of the batteries at Agra. Marked variations are apparent between different corps in the same station; for example, in the 88th at Agra, during ten months' occupation, the average was only 17. On the other hand, examples are not wanting in which the similarity between the results as shewn in different bodies of men in the same locality were singularly alike. At Peshawur, for instance, the number of days spent in hospital by each man of the 1-5th and 38th Regiments was almost identical, having been 32·0 in the one and 32·9 in the other. For the Army generally the average time spent in hospital by each man throughout the year was 22 days.

The strength of officers, men, women, and children quartered in the hills during the hot season of 1870 is here detailed.

90. The results of hill stations have already been referred to, and more details may be learnt on an examination of Tables X, XI, XII, and XIX. It may be useful for future reference to place on record the number of men, women, and children who were stationed in the hills during the hot season and rains of 1870, distinguishing those also who were with their regiments from those who were either at convalescent depôts or with working parties.

	Detail of strength.							
	Officers.	Sergeants.	Rank and File.	Total Non-Commissioned Officers, Rank and File.	Wives.	Children.		
						Over 10 years.	Under 10 years.	Under 2 years.
At Hill Stations... ...	123	180	2,914	3,094	270	34	246	138
At Convalescent Depôts ...	63	134	1,807	1,941	262	46	308	107
Working parties... ...	40	53	1,123	1,176	50	5	56	23
TOTAL ...	226	367	5,844	6,211	582	85	610	268

In the working parties the numbers, it is to be observed, varied. The Quarter Master General's return gives a total of only 1,176. The note to Table XIX explains that, while the average for the season was 904, the strength at one time was 1,575. It may be mentioned that on the 1st June 1871 the number of Non-Commissioned Officers, rank and file in the hills amounted to 6,855.

The working parties continued to be very successful.

91. The working parties of soldiers employed in the hills continued to be very successful.

The statistics given in the seventh division of Table XIX shew that out of an average strength of 904 men only 7 deaths occurred, and of these it is to be remarked that 2 were the result of accident. Both the death and sickness rates are unduly raised, by adapting the returns of seven months so as to exhibit the statistics as if for the year. Had the hills been occupied during the whole year, including the very favorable climate of the cold weather, the annual ratio of admissions would have been much under 1,576, and that of deaths under 7·74 per 1,000. With reference to the financial bearing of these working parties, it has been resolved, 1*st*, that a system of contract should almost universally be adopted; and 2*nd*, under no circumstances should the ordinary rates be exceeded.

The convalescent depôts might give better results if occupied also during the winter.

92. The statistics of the hill convalescent depôts are given generally in Table VIII, and the details for each of them separately appear in the last division of Table XIX. The men composing them having all been selected on account of ill-health, the amount of sickness and mortality amongst them has been high. The admissions equalled 1,365, the daily sick 96, and the deaths 22·62 per 1,000. The statistics of these depôts are chiefly interesting in connection with the question of invaliding. Out of an average strength of 1,945 men, 414, or 212·85 per 1,000, were sent to England; that is to say, in between one-fourth and one-fifth of the number of men who had been sent up to the hills on account of sickness, the change failed to produce the desired result. More marked benefit might be produced if the men were kept up in the hills during the winter months. The hot weather and rains, even in the Himalaya, can be regarded as little better than a means of escaping the much more trying climate of the plains, but in the bracing winter months great and permanent good might in many cases be anticipated.

The system of interchanging recovered men at Kussowlie with those at Umballa who required change has been so far successful.

93. In 1870 an important experiment was tried in removing men from the convalescent depôt at Kussowlie whose health had recovered, and replacing them by others from the neighbouring station of Umballa who required a change. Dr. Munro, the Deputy Inspector General of Hospitals, who proposed this regular system of exchanges during the hot weather and rains, was of opinion that in this manner the benefits of the hill depôt might be more widely extended, and the sanitarium rendered more useful than it had been under previous arrangements. The result of the experimental trial which was sanctioned has been so far successful. Fifty-seven men returned to Umballa much benefited by their short residence at Kussowlie, and none of these, except two who had been sent down because they were not fit cases for the hills, were admitted into hospital during the remainder of the season. All the others were able to resume and continue at duty. At the same time these were sent down equal numbers were brought up—men who required a change and whose condition at the end of the season bore evidence to the advantages which they had enjoyed. Of the three women sent up two unfortunately died shortly after arrival at Kussowlie. Had their removal from the plains at an earlier date been possible, one at least would in all probability have recovered. A further trial of the system is now being made.

Dr. Bryden's ten-year tables, 1860—69, have nearly been completed.

94. Before leaving the subject of sickness and mortality in the European Army in this Presidency, mention must be made of the statistics of previous years which have been compiled and tabulated by Dr. Bryden. These consist of two volumes; one which has been printed and submitted to the Government, and another which is still in preparation. The first of these contains the annual tables from 1858 to 1869, which have already appeared in the first six Sanitary Reports, with a valuable appendix. The second volume refers to the ten years 1860—69—a period which commences after the exposure attendant on the suppression of the mutinies had ceased, and during which the Army was subject to no special vicissitudes. The statistics of these ten years have been arranged to show the sickness and mortality in different groups and stations, the prevalence of the chief diseases, the mortality which they occasioned in each year, and many other points of great practical interest and importance. They indeed form a mine of information on all subjects connected with the vital statistics of the European Army in this Presidency, and bear ample evidence to the unwearied industry and singular ability which Dr. Bryden has brought to bear on this great question. The greater part of these tables is now ready, but the constant and ever increasing press of current work has prevented their completion. I hope soon to be able to submit them to the Government.

Daily sick-rate for each month of the ten years 1860—69, Bengal.

95. In the meantime some general statements regarding the sickness and mortality during these ten years will prove of interest. The annexed table shows the daily sick-rate in each month at the different stations and in each province. It would be

impossible within reasonable limits to draw attention to all the interesting points which are here shewn. An examination of the figures will show the variations in different months, the time of maximum and minimum sickness, and the places which stand highest and lowest in the scale.

European Army of the Bengal Presidency, 1860 *to* 1869.

STATIONS.	Aggregate of the Annual Strength of the 10 years.	DAILY SICK PER 1,000 OF THE AVERAGE STRENGTH.												Average Annual Ratio for the 10 years.
		Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
Fort William ..	8,812	56·5	64·1	72·1	63·1	73·0	82·3	88·0	89·6	75·5	69·6	59·4	49·9	70·6
Dum-Dum ..	5,872	47·1	52·7	62·9	61·3	78·3	84·8	66·6	69·7	79·8	82·8	63·4	54·0	65·9
Barrackpore ...	6,258	67·5	65·7	59·2	69·4	76·1	78·8	97·3	93·8	86·8	73·6	59·2	63·9	74·8
Berhampore .	1,897	60·4	52·4	56·0	52·2	55·3	59·2	73·7	81·3	100·7	102·6	86·2	75·6	72·2
BENGAL PROPER ..	24,286*	55·8	61·0	63·1	62·7	72·9	78·4	82·8	83·7	81·9	76·1	61·7	55·5	69·6
Hazareebaugh ..	6,840	62·7	74·4	74·6	76·0	74·9	78·0	77·5	77·6	75·1	65·2	55·6	41·1	70·5
Dinapore	8,817	74·2	69·6	75·3	81·0	76·2	72·1	68·2	77·2	80·7	68·1	62·1	58·5	72·1
Benares	9,408	68·5	69·0	81·3	86·2	91·3	98·9	95·8	97·7	110·1	92·5	71·9	62·9	84·5
Fyzabad ..	9,834	55·3	59·5	60·2	64·8	62·8	63·6	71·4	72·0	71·1	62·3	50·8	45·3	61·8
Rae Bareill	3,825	46·5	46·7	47·7	53·7	55·1	46·7	48·5	57·5	56·8	57·5	46·7	39·5	50·4
Lucknow ..	22,485	57·8	59·7	65·8	69·9	69·0	68·7	70·5	73·9	79·2	73·8	61·0	53·0	67·0
Seetapore ..	6,126	54·0	54·0	58·7	69·1	72·4	65·7	66·4	72·0	70·5	62·9	51·0	49·9	62·7
Futtehghur .	3,607	59·4	58·9	72·6	69·6	72·8	71·1	73·5	73·2	80·4	75·7	71·4	60·1	69·9
Cawnpore	10,098	54·1	61·6	68·0	70·9	68·8	69·4	73·1	76·6	84·0	80·8	65·9	57·3	69·3
Allahabad	11,626	55·8	59·4	62·1	71·9	69·6	72·5	74·2	83·9	95·3	97·3	86·2	61·1	74·0
Nagode ..	1,657	45·8	51·7	65·5	64·9	64·5	66·2	69·6	67·1	68·6	90·5	89·9	51·1	66·4
GANGETIC PROVINCES AND OUDE	105,971	60·0	61·7	66·8	72·4	72·6	72·8	73·5	77·3	81·2	74·8	63·8	54·6	69·5
Shajehanpore	4,906	53·1	57·4	59·2	68·2	74·9	68·4	70·1	66·5	64·9	57·8	51·3	39·1	61·3
Bareilly ...	9,216	54·5	55·6	50·4	54·4	52·6	55·3	61·5	64·8	64·8	57·2	52·0	50·4	56·1
Moradabad ...	3,316	60·1	59·9	57·6	72·6	75·3	79·6	77·2	84·2	88·4	75·9	65·8	52·4	71·5
Roorkee	4,803	60·2	62·2	62·6	58·9	61·3	58·7	59·1	65·3	62·9	60·9	53·9	52·2	60·0
Meerut ...	18,779	61·8	65·2	69·2	74·7	75·6	71·1	79·8	81·4	83·4	80·1	74·6	54·7	73·1
Delhi ...	7,225	87·6	93·6	90·4	87·0	100·8	106·1	102·9	109·4	119·8	109·3	103·7	75·0	98·5
Muttra ...	4,115	60·5	66·2	63·2	71·6	72·1	70·2	73·2	74·3	70·9	62·6	57·4	52·9	66·8
ROHILCUND AND MEERUT.	57,090	63·2	66·6	65·4	73·4	77·3	77·4	80·4	82·7	83·5	75·5	68·0	54·8	72·8
Agra ...	10,410	56·9	58·0	58·2	58·7	67·5	66·4	71·5	89·6	97·2	102·8	85·7	61·5	72·5
Morar ...	10,232	59·6	58·5	60·2	68·8	63·2	62·5	66·2	71·8	78·0	84·4	76·6	60·9	67·1
Gwalior Citadel ...	2,032	48·7	48·5	57·2	59·0	67·5	64·9	60·5	70·1	69·2	63·5	51·5	41·1	59·1
Seepree ...	845	...	..	...	56·5	58·1	62·6	69·4	80·7	102·5	80·4	...	...	...
Jhansie	6,350	64·8	66·9	59·4	69·3	75·8	75·8	80·7	103·0	107·4	114·3	105·6	69·0	81·9
Nowgong ...	1,866	44·2	52·1	48·2	52·5	59·3	61·0	60·6	58·7	62·5	61·8	53·8	43·8	55·2
Jubbulpore ...	7,313	59·4	60·8	65·3	68·9	70·8	72·0	77·4	89·3	98·2	109·5	101·9	80·7	79·4
Saugor ...	8,014	65·0	67·3	75·3	81·1	80·9	80·7	80·9	88·2	102·0	103·1	86·6	67·9	81·7
AGRA AND CENTRAL INDIA.	48,675	59·1	60·2	62·1	67·6	70·2	70·2	73·4	84·8	93·1	98·3	87·3	65·1	74·1
Umballa ...	15,198	42·7	54·6	62·3	59·0	65·5	65·2	63·9	63·6	67·5	55·7	46·5	36·7	57·2
Phillour ...	889	33·1	34·5	36·9	44·2	51·2	50·2	60·1	65·8	64·0	56·4	48·3	41·9	49·5
Jullundur ...	7,882	36·5	39·1	45·9	43·8	51·4	50·3	46·9	48·2	52·1	48·6	49·1	42·2	46·6
Ferozepore .	8,520	39·7	46·6	47·9	52·8	55·0	53·8	53·0	58·1	58·7	50·1	44·2	33·7	50·0
Mooltan ...	8,756	50·4	54·3	52·7	52·6	53·5	56·7	63·2	64·3	74·1	72·6	60·9	47·5	58·5
Dera Ismael Khan	1,011	43·3	41·0	34·4	30·2	46·2	48·9	46·1	66·7	69·7	71·1	79·1	71·4	53·4
Meean Meer	12,385	47·2	49·9	53·2	49·5	62·2	67·5	66·2	77·1	95·8	93·3	76·2	60·8	66·6
Fort Lahore	1,382	45·9	33·1	24·4	31·5	42·1	44·6	45·4	57·4	72·5	70·0	57·4	46·8	67·0
Umritsur	3,201	42·5	39·0	36·9	51·5	60·2	62·0	59·3	76·4	85·8	68·5	52·5	50·0	57·5
Sealkote	12,487	47·5	51·8	51·2	50·0	57·8	64·7	65·4	66·5	68·7	60·7	55·0	42·5	57·0
Rawul Pindee	14,741	54·9	48·6	49·8	52·9	56·6	58·4	63·8	66·4	73·5	71·9	57·2	48·3	57·9
Campbellpore	2,997	34·2	36·8	41·5	38·7	42·0	51·8	57·6	66·2	44·9	38·3	28·9	29·2	44·0
Attock	1,584	39·5	40·1	36·2	40·6	50·3	52·0	48·4	56·6	61·7	64·4	75·4	53·3	51·8
Nowshera	6,426	53·4	50·4	36·4	39·0	46·8	53·7	59·1	58·4	55·2	62·4	70·3	59·8	52·9
Peshawur	18,870	53·1	50·4	51·3	53·8	70·8	76·9	75·6	73·0	80·8	83·3	74·6	59·7	66·2
PUNJAB	146,697	46·0	47·1	49·8	51·7	59·2	61·5	64·2	65·7	67·7	63·2	54·9	46·0	56·7
Darjeeling	2,792	47·3	36·4	33·6	40·3	42·0	45·7	45·9	49·4	35·9	36·0	35·8	31·0	39·4
Dugshaie	6,716	33·7	34·6	38·6	51·6	51·5	51·4	60·8	57·8	50·9	43·9	37·2	31·6	48·4
Subathoo	6,700	49·7	50·5	67·6	70·5	71·2	69·6	71·8	70·6	60·8	50·9	41·7	39·8	62·1
Kangra	862	40·4	38·5	42·7	42·5	42·6	36·4	34·6	49·9	53·7	45·9	43·1	36·4	41·8
Road-making Detachments.	2,320	...	...	...	...	...	...	...	...	...	...	...	...	...
HILL STATIONS	19,390	42·9	40·2	52·1	55·2	50·3	51·8	56·3	55·3	49·3	43·5	39·2	34·9	49·2
BENGAL PRESIDENCY	390,678	57·7	58·8	61·2	64·9	69·2	70·5	72·7	76·3	79·2	74·4	64·3	54·8	67·1

* The total for the stations does not represent the total strength for the province. Several stations occupied temporarily and for broken periods are included in the total for the province.

96. A similar statement has been obtained from the Madras Presidency for the same years.

A similar statement for Madras.

European Army of the Madras Presidency, 1860 to 1869.

STATIONS.	Strength.	Daily Sick-rate of each Month per 1,000 of the Average Strength. January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Average annual sick-rate for the period.
Bangalore ...	15,047	39·9	42·5	47·2	47·8	48·5	50·5	54·5	53·8	56·4	53·8	51·2	45·0	49·3
Kamptee ...	10,946	46·5	49·3	46·5	47·4	52·0	55·7	56·6	59·3	65·7	58·4	49·3	43·8	52·6
Bellary ...	9,609	59·3	55·1	60·3	57·3	65·5	64·5	68·7	63·5	63·5	63·5	64·5	62·4	62·3
Secunderabad ..	25,984	71·2	59·3	62·7	60·8	61·2	58·5	62·7	72·7	80·4	82·3	81·6	78·9	69·3
St. Thomas Mount...	3,579	72·6	78·2	89·4	75·4	83·8	86·6	83·8	72·6	72·6	69·8	72·6	67·0	77·0
Rangoon ...	8,879	49·5	51·8	51·8	51·8	49·5	55·2	60·8	58·5	55·2	52·9	58·5	50·6	53·8
Madras ...	9,198	66·3	69·4	64·1	66·3	75·0	65·2	68·5	72·8	67·4	68·5	68·5	58·7	67·6
Toughoo ...	5,212	53·7	49·9	61·4	53·7	53·7	55·6	57·6	57·6	59·5	59·5	55·6	49·9	55·7
Thayetmyo ...	4,554	48·3	59·3	63·7	63·7	74·7	74·7	85·7	72·5	68·1	59·3	59·3	54·9	65·3
Cannanore ...	7,139	56·0	51·8	50·4	49·0	53·2	53·2	54·6	56·0	60·2	57·4	54·6	53·2	54·2
Calicut ...	828	36·1	24·1	48·2	36·1	36·1	36·1	36·1	36·1	36·1	48·2	72·3	48·2	41·2
Malliapooram ...	1,088	27·5	27·5	36·7	36·7	36·7	45·8	36·7	36·7	36·7	36·7	36·7	36·7	36·0
Trichinopoly ...	2,408	53·9	49·8	45·6	58·1	62·2	62·2	70·5	74·7	70·5	66·4	78·8	70·5	63·6
Port Blair ...	538	37·0	37·0	37·0	55·5	37·0	55·5	74·1	55·5	74·1	55·5	37·0	37·0	49·3
Seetabuldee ...	181	55·5	55·5	55·5	111·1	111·1	111·1	111·1	166·6	166·6	166·6	111·1	111·1	111·0
Singapore ...	747	40·0	53·3	40·0	40·0	40·0	40·0	40·0	40·0	40·0	40·0	40·0	26·6	40·0
Palaveram ...	398	25·0	70·5	25·0	0·7	0·2	0·7	0·5	0·7	25·0	25·0	25·0	25·0	21·0
Penang ..	265	74·1	37·0	37·0	74·1	37·0	37·0	74·1	37·0	37·0	37·0	37·0	37·0	46·3
Waltair ...	427	47·6	23·8	47·6	47·6	47·6	71·4	71·4	47·6	47·6	47·6	47·6	47·6	49·6
Masulipatam ...	193	52·6	105·2	52·6	52·6	52·6	52·6	105·2	105·2	52·6	105·2	105·2	0·2	70·2
Jaulnah ...	338	58·8	58·8	88·2	29·4	29·4	0·1	29·4	29·4	29·4	29·4	29·4	29·4	36·8
DEPOTS.														
Poonamallee ...	2,014	228·9	208·9	159·2	114·4	104·4	124·3	144·2	134·3	149·2	144·2	154·2	169·1	154·9
Wellington ..	5,376	53·9	48·3	52·0	61·3	70·6	68 7	66·9	65·0	66·9	59·4	61·3	74·3	62·5
Ramandroog ...	548	36·4	36·4	54·5	109·1	127·2	109·1	90·9	72·7	72·7	54·5	54·5	36·4	71 2
Chindwarrah ...	255	16·00	120·0	160·0	240·0	240·0	240·0	280·0	280·0	280·0	200·0	200·0	160·0	213·3
TOTAL ...	1,15,748	59·4	56·9	58·4	57·5	60·5	60·6	64·4	65·4	67·9	65·9	65·3	61·2	62·0

A similar statement for Bombay.

97. There is also a similar statement for Bombay.

European Army of the Bombay Presidency, 1860 *to* 1869.

STATIONS.	Strength.	Daily Sick-rate of each Month per 1,000 of the Average Strength.												Average annual sick-rate for the period.	Remarks.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
Bombay ...	4,650	81·9	84·1	81·9	80·4	86·	85·8	91·8	79·4	64·9	70·1	60·2	77·8	78·7	
Surat ...	120	66·7	125·	141·7	100·	66·7	66·7	100·	133·3	125·	125·	158·3	75·	106·9	From January 1861 to November 1862 only.
Deolalee ...	932	9·7	15·	23·6	33·3	40·8	47·2	49·4	57·9	66·5	66·5	39·7	113·7	46·9	From November 1867 to December 1869.
Butcher's Island ...	107	18·7	18·7	18·7	...	...	83·1	93·5	140·2	...	...	9·3	...	31·8	Two months in 1866, one month in 1867 and four months in 1869.
Ahmedabad and Dholiacote ...	2,894	37·3	40·4	36·9	32·1	30·7	34·9	39·4	62·2	63·2	71·5	57·	41·1	45·6	
Baroda ...	379	42·2	44·9	36·9	60·7	52·8	68·6	81·8	150·4	139·8	255·9	187·3	66·	98·9	
Teetbul and Bulsar ...	59	186·4	186·4	203·4	288·1	440·7	271·2	...	...	...	...	16·9	67·8	138·3	No Troops present in 1860-61 or 1862.
Deesa ...	8,318	37·9	39·8	41·8	35·6	33·5	34·9	39·8	52·2	55·8	55·8	44·7	37·1	42·4	
Mount Aboo	810	27·2	28·4	60·5	95·1	107·4	80·2	69·1	66·7	58·	60·5	44·4	40·7	61·5	
Belgaum ...	9,869	61·4	67·	66·	64·7	70·5	72·6	73·8	81·9	75·9	76·3	67·	62·3	69·9	
Rairee ...	43	325·6	697·7	127·9	127·9	558·1	325·6	69·8	...	...	...	...	...	377·9	No Troops present in 1865-66 or 1869.
Aden ...	5,657	43·8	45·3	48·3	55·	56·6	63·1	60·1	65·2	63·9	57·5	56·2	50·2	55·4	
Poona ...	18,952	53·6	57·6	47·7	47·4	45·6	49·8	58·3	68·8	61·1	55·4	49·4	44·3	53·2	
Kirkee ...	4,810	41·4	44·8	47·8	46·8	49·5	53·7	57·	77·5	73·2	69·	55·5	49·3	55·4	
Khandalla ...	734	267·2	107·6	92·6	83·1	73·6	49·	10·9	10·9	2·7	31·3	100·8	247·9	89·8	
Sattara ...	1,638	48·9	48·9	52·6	47·1	33·6	31·2	38·6	60·6	59·4	50·2	40·4	42·8	46·2	No Troops present in 1863.
Ahmednuggur ...	4,930	63·5	65·3	72·8	74·3	77·1	77·9	86·4	99·8	95·1	89·8	84·8	51·3	78·2	
Asseerghur ..	982	49·9	49·9	43·8	45·7	46·8	38·7	39·7	59·1	59·1	44·8	29·5	31·6	44·9	
Poorundhur .	735	89·8	112·9	153·7	201·4	213·6	157·9	110·2	111·6	65·3	99·3	146·9	66·7	127·4	
Maunder Deo	176	...	...	73·9	90·9	90·9	39·2	...	...	...	...	...	...	24·6	Four months in 1866 only.
Sholapore ...	921	56·5	54·3	70·6	61·9	63·	68·4	74·9	89·	85·8	70·6	70·6	61·9	68·8	No Troops present in 1860 or 1861.
Mhow ...	12,667	47·9	53·3	56·8	54·9	57·4	57·4	63·5	77·2	83·9	91·3	73·3	54·8	64·3	
Indore ...	867	19·6	27·7	27·7	31·1	27·7	26·5	25·4	42·7	49·6	54·2	28·6	19·6	31·7	
Nusseerabad .	8,663	45·4	45·7	51·4	62·3	64·2	61·9	70·7	90·3	111·9	121·2	81·4	58·2	72·	
Neemuch ...	4,186	52·6	51·4	47·5	52·1	61·4	58·8	62·1	94·1	116·6	147·4	110·1	74·5	77·4	
Ajmere ...	488	26·7	28·7	32·8	30·8	24·7	18·5	40·9	47·1	38·9	38·9	38·9	28·7	33·	
Tarraghur ...	142	14·1	...	42·3	197·2	443·5	422·5	415·5	443·5	387·3	316·8	218·3	147·8	254·1	No Troops present in 1864 or 1865.
Kurrachee ...	10,243	51·2	59·3	47·7	39·3	47·6	44·5	44·9	48·9	50·4	51·4	61·5	54·4	50·1	
Ghizree ...	554	126·4	142·6	119·1	167·9	299·7	310·5	287·	268·9	243·7	213·	232·9	209·4	218·4	
Hyderabad ...	3,483	32·2	34·8	41·7	30·8	42·5	41·3	42·9	40·5	44·5	46·4	44·2	37·4	39·9	
On march ...	4,299	70·9	40·	27·2	4·2	1·4	·2	...	·7	·5	1·7	86·8	126·1	30·	
BOMBAY PRESIDENCY ...	1,13,308	52·6	54·2	53·3	52·6	55·6	55·8	59·	69·9	70·3	72·	65·1	57·3	59·8	

The Local European Troops are included in this return from 1862, the date of their transfer to the British Service.

The average daily sick for the months of January, February, March, April, May, June and July 1860 not included in this return, as no records have been kept by months in this office.

Statement shewing ratio of admissions into hospital per 1,000 of strength, 1860—69, Bengal.

98. No statements of the admissions into hospital for Madras and Bombay for the ten years 1860 to 1869 have yet been received, but this information as regards Bengal is given in the following table:—

European Army of the Bengal Presidency, 1860 *to* 1869.

STATIONS.	Strength.	ADMISSION-RATE PER 1,000 OF THE AVERAGE STRENGTH.												Average for the ten years.
		Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	
Fort William ...	8,812	127·6	137·8	134·2	134·8	147·6	156·6	202·3	170·5	142·5	134·4	111·3	112·1	1719·6
Dum-Dum ...	5,872	124·1	117·7	134·5	155·3	231·0	197·0	174·4	170·6	184·8	188·8	166·0	135·4	1947·7
Barrackpore ...	6,258	119·2	101·6	126·1	154·2	148·9	198·6	234·1	197·7	172·3	148·6	141·3	129·0	1892·1
Berhampore ...	1,897	145·2	117·8	138·2	127·9	122·3	133·1	143·8	165·7	268·2	204·8	188·8	193·7	1966·8
BENGAL PROPER ...	24,286	124·2	117·8	126·2	144·1	161·8	172·3	196·8	176·5	173·7	159·0	139·8	128·1	1821·2
Hazareebaugh ...	6,841	143·7	130·9	128·8	155·2	146·4	138·7	149·9	133·7	111·8	122·2	79·5	81·5	1535·7
Dinapore ...	8,817	140·0	118·8	145·6	151·8	142·3	138·3	152·1	171·5	163·8	165·2	135·8	114·5	1738·6
Benares ...	9,408	126·2	112·3	165·6	207·4	188·7	223·6	219·2	229·7	232·1	204·1	144·6	125·6	2140·3
Fyzabad ...	9,834	94·7	83·4	107·4	134·4	121·1	128·1	151·8	133·1	107·6	115·0	92·3	92·9	1366·5
Rae Bareilly ...	3,825	90·2	73·9	73·6	96·9	97·8	101·1	120·4	119·4	93·7	104·3	91·0	74·0	1141·2
Lucknow ...	22,485	93·7	86·7	114·2	133·1	121·4	125·5	134·8	152·8	148·7	123·6	95·9	89·9	1425·9
Seetapore ...	6,126	86·2	76·6	118·2	131·3	116·7	122·2	121·8	122·4	122·0	108·0	89·3	86·6	1304·4
Futtehghur ...	3,607	106·8	91·2	109·8	123·8	106·1	126·1	132·0	138·0	150·4	157·9	133·0	120·2	1492·9
Cawnpore ...	10,098	108·6	92·6	123·9	138·8	123·3	143·4	161·8	176·0	164·8	165·7	135·5	105·0	1641·8
Allahabad ...	11,626	126·4	104·8	153·9	162·8	144·5	156·9	191·2	208·6	204·9	246·6	175·3	119·3	1992·3
Nagode ...	1,657	91·0	120·0	111·1	124·0	134·8	134·2	138·0	143·1	180·6	337·2	289·3	171·5	1960·8
GANGETIC PROVINCES AND OUDE.	105,971	113·5	97·4	128·5	150·3	134·7	142·9	154·0	161·2	152·5	152·4	117·7	104·6	1614·6
Shajehanpore ...	4,906	93·6	78·7	91·7	128·5	114·7	111·8	121·1	106·9	100·3	95·1	75·1	67·5	1193·4
Bareilly • ...	9,216	71·5	69·1	77·0	94·9	88·1	100·6	119·9	115·6	97.8	93·3	76·2	79·8	1084·7
Moradabad ...	3,316	76·1	80·8	97·0	134·1	115·4	117·2	134·7	123·0	103·3	119·7	100·1	90·6	1310;6
Roorkee ...	4,803	132·4	97·7	104·3	147·0	139·4	120·8	134·0	148·2	131·6	137·4	142·9	105·0	1540·7
Meerut ...	18,779	114·6	99·5	119·8	151·0	149·0	133·4	191·1	170·9	165·2	153·0	125·3	88·8	1672·7
Delhi ...	7,225	145·1	131·7	156·2	195·0	201·7	190·6	229·8	233·8	232·0	234·4	179·3	136·2	2254·1
Muttra ...	4,115	116·4	108·4	116·0	160·1	126·9	134·3	154·5	165·2	143·2	132·5	129·8	104·5	1599·8
ROHILCUND AND MEERUT.	57,090	108·0	95·9	112·3	155·1	140·0	135·1	164·5	156·2	145·5	138·6	115·1	93·5	1576·4
Agra ...	10,410	109·3	86·7	107·2	132·0	136·9	130·8	197·2	255·5	255·3	230·5	176·9	115·2	1923·0
Morar ...	10,232	121·4	107·1	144·0	188·6	151·0	161·2	207·8	245·1	198·2	225·8	215·4	176·1	2134·8
Gwalior Citadel ...	2,032	71·1	80·9	104·8	135·7	115·0	122·3	147·5	209·8	123·3	132·4	99·0	77·6	1438·5
Seepree ...	845	...	...	...	157·8	134·2	127·6	147·1	198·3	233·3	260·6	...	...	...
Jhansie ...	6,350	167·7	125·0	127·6	149·6	170·3	185·1	209·3	282·5	259·7	370·7	201·3	187·1	2485·2
Nowgong ...	1,866	107·9	100·4	88·4	142·5	124·9	140·8	161·2	134·0	132·9	160·7	129·5	94·1	1524·1
Jubbulpore ...	7,343	131·9	117·0	131·6	146·4	156·7	155·1	179·5	196·5	247·0	380·4	316·5	194·1	2342·0
Saugor ...	8,014	152·4	137·0	150·9	167·5	161·6	156·8	182·5	213·8	255·2	329·4	246·4	180·8	2328·4
AGRA AND CENTRAL INDIA.	48,675	129·4	111·5	128·3	157·3	151·6	154·1	192·4	233·4	235·8	288·4	236 3	162·9	2169·2
Umballa ...	15,198	83·0	84·0	122·7	162·0	163·4	154·9	162·9	166·9	177·1	157·4	100·9	87·7	1631·3
Phillour ...	889	76·1	64·6	74·8	115·8	129·5	118·5	168·3	228·7	223·9	251·0	165·7	130·7	1791·9
Jullundur ...	7,882	97·8	81·2	96 7	120·1	126·7	128·4	131·5	136·9	139·2	139·2	139·8	109·8	1463·0
Ferozepore ...	8,520	82·8	84·3	98·9	155·3	137·8	134·3	154·4	147·1	116·0	113·4	111·3	81·0	1440·4
Mooltan ...	8,756	107·5	103·9	108·1	144·6	148·8	148·0	185·4	196·5	224·6	236·7	197·2	174·9	1965 2
Dera Ismael Khan...	1,011	106·7	80·0	67·8	80·9	107·1	132·0	106·9	183·3	213·9	283·6	276·9	234·7	1864·5
Meean Meer ...	12,385	97·1	88·3	106·0	127·8	142·0	149·6	166·5	252·8	250·9	254 3	209·8	162·9	2012·2
Fort Lahore ...	1,382	129·2	86·6	73·3	113·6	134·2	157·2	165·4	271·1	301·9	307·6	233·2	180·6	2135·3
Umritsur ...	3,201	92·3	65·2	87·6	133·3	148·2	136·3	160·5	216·0	247·2	157·0	135·5	126·8	1714·8
Sealkote ...	12,487	108·1	96·2	95·7	108·5	135·0	149·0	156·3	154 4	138·4	128·5	104·2	97·5	1483·5
Rawul Pindee ...	14,741	142·4	102·0	118·4	134·3	163·7	171·8	187·3	173·7	180·3	217·4	167·0	118·9	1845·9
Campbellpore ...	2,997	72·9	82·1	88·1	84·2	139·8	165·5	164·3	169·0	98·6	98·3	75·9	79·2	1380·0
Attock ...	1,584	121·5	101·2	89·7	110·9	168·9	157·2	177·6	182·9	196·4	308·4	331·8	189·0	2150·9
Nowshera ...	6,426	124·0	92·9	85·1	95·6	139·9	160·4	203·0	199·5	158·5	245·8	237·5	157·2	1850·8
Peshawur ...	18,870	123·1	96·9	111·2	134·5	265·4	230·5	259·5	257·4	302·2	361·7	300·8	190·1	2579·6
PUNJAB ...	146,697	102·7	88·7	102·9	130·7	157·0	155·6	170·1	176·8	178·4	186·0	162·3	126·8	1740 7
Darjeeling ...	2,792	117·6	67·2	85·8	103·4	96·1	100·3	83·9	74·7	63·5	72·2	60·2	55·5	976·0
Dugshaie ...	6.716	52·9	54·3	68·7	93·4	94·9	102·4	96·9	74·6	59·7	54·1	53·8	49·4	915·3
Subathoo ...	6,700	96·2	74·9	118·3	112·4	131·2	115·0	123·6	112·2	83·3	87·7	73·7	80·2	1248·4
Kangra ...	862	84·7	67·7	85·4	81·6	124·7	97·3	114·5	141·9	123·9	135·3	150·7	61·0	1287·7
Road-making Detachments ...	2,320	...	...	...	61·0	79·0	105·2	99·7	99·8	82·4	62·9	...	...	1059·1
HILL STATIONS ...	19,390	...	...	...	...	...	...	...	...	...	...	...	...	...
BENGAL PRESIDENCY	3,90,678	114·1	90·0	118·6	145·5	149·3	151·2	170·3	177·3	172·8	181·6	150·8	123·1	1754·9

99. The deaths among the European Army of Bengal for each station during the ten years are as follows :—

Statement shewing the mortality in the Bengal Army, 1860—69.

European Army of the Bengal Presidency, 1860 *to* 1869.

STATIONS.	Average Strength for the 10 years.	Death-rate per 1,000 from the chief causes of Mortality.														Average Annual Death-rate.	
		Cholera.	Small-pox.	Fevers.	Apoplexy.	Delirium tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Respiratory diseases.	Heart diseases.	Phthisis pulmonalis.	Wounds and Accidents.	All other causes.	Died out of Hospital, 1864—1869.	All causes.	Excluding the Cholera rate.
Fort William ...	8,812	8·85	...	2·04	1·02	·80	3·41	·68	2·50	·91	·45	1·70	·45	1·36	1·02	25·19	16·34
Dum-Dum (9 years)	5,872	4·26	...	4·43	3·24	1·53	6.81	·85	4·95	·85	1·02	·85	·17	2·04	1·70	32·70	28·44
Barrackpore ...	6,258	3·83	·16	5·27	2·55	·48	7·51	·80	3·36	1·28	·48	2·08	·16	3·36	·80	32·12	28·29
Berhampore ...	1,897	4·22	...	11·07	2·11	1·05	2·11	...	5.80	...	...	·53	·53	1·58	1·05	30·05	25·83
Bengal Proper ...	24,286	6·26	·04	4·32	2·02	·95	5·23	·66	3·58	1·07	·58	1·52	·29	1·98	1·07	29·57	23·31
Hazareebaugh ...	...	2·78	·15	5·12	·44	·29	3·95	..	1·61	·58	·73	·87	...	2·48	·15	19·15	16·37
Dinapore ...	8,817	2·49	·23	3·63	2·38	·23	3·52	·79	4·54	·57	·57	1·59	...	1·81	·90	23·25	20·76
Benares ...	9,408	10·20	·32	5·42	3·19	·85	3·19	·64	4·36	·95	·95	1·81	·32	1·92	1·06	35·18	24·98
Fyzabad ...	9,834	5·29	·20	1·73	2·95	·51	1·93	·20	1·93	·81	1·12	1·83	...	1·32	·51	20·13	14·84
Rae Bareilly (8 years) ...	3,825	·26	·26	2.35	·78	1·05	·52	·52	2·88	·78	...	1·31	...	2·62	·78	14·11	13·85
Lucknow ...	22,485	8·18	·40	2·93	2·09	·31	2·14	·36	4·27	·89	·93	1·78	·27	2·18	·93	27·66	19·48
Seetapore ...	6,126	2·29	·49	3·60	1·80	·65	1·30	·33	2·12	·81	1·30	·49	...	1·80	·49	17·47	15·18
Futtehghur ...	3,607	1·66	...	2·77	2·77	·28	1·11	·56	2·22	1·94	·56	·83	·28	2·49	·83	18·30	16·64
Cawnpore ...	10,098	10·30	·89	3·47	1·78	1·09	3·17	2·67*	2·87	·69	·50	1·88	·10	2·18	·59	32·18	21·88
Allahabad ...	11,620	19·53	1·03	5·51	3·61	·86	4·04	1·20	5·25	·60	1·12	1·89	·35	2·58	1·03	48·60	29·07
Nagode (8 years) ...	1,657	10·86	...	1·81	...	...	·60	...	2·42	·60	3·62	1·21	·60	4·83	2·42	28·97	18·11
Gangetic Provinces and Oudh.	105,971	8·12	·40	3·72	2·24	·58	2·71	·77	3·47	·93	·85	1·60	·21	2·24	·75	*28·59	20·47
Shajehanpore ...	4,906	5.10	...	2·85	1·02	...	·61	...	2·04	·82	·82	2·65	...	2·24	·40	18·55	13.45
Bareilly ...	9,216	1·20	·32	1·30	1·30	·65	1·63	·22	3·15	·54	·43	·87	·11	1·41	·43	13·56	12·36
Moradabad ...	3,316	2·11	...	1·21	1·21	·30	2·11	·60	3·32	1·21	1·21	1·81	·30	2·41	·30	18·10	15·99
Roorkee ...	4,803	·21	·21	6·24*	1·25	·21	2·08	...	1·46	·62	·83	1·88	...	1·67	·21	16·87	16·66
Meerut ...	18,779	12·94	1·12	3·18	2·08	·59	2·40	·53	2·93	·43	·74	1·39	·21	1·34	·53	30·41	17·47
Delhi ...	7,225	7·20	·97	6·64	3·04	·28	7·06	2·21	4·29	1·25	·55	1·94	·28	3·32	·69	39·72	32·52
Muttra ...	4,115	7·05	·97	3·40	2·68	·97	·24	·24	2·19	·50	·24	·97	·24	1·46	·24	21·39	14·34
Meerut and Rohilcund.	57,090	6·55	·67	3·35	1·75	·44	2·66	·82	3·78	·88	·74	1·70	·19	2·52	·56	26·61	20·06
Agra ...	10,410	19·12	·67	4·71	2·88	·86	1·35	·38	2·79	1·15	.29	1·92	·19	1·73	6·38	38·42	19·30
Morar ...	10,232	35·09	·29	4·79	5·38	1·17	2·74	1·95	3·81	1·37	1·27	·68	·59	1·76	·68	61·57	26·48
Gwalior Citadel ...	2,032	19·69	·49	2·46	6·40	·49	·98	...	3·94	·98	·98	·49	·98	49	1·98	40·35	20·66
Seepree ...	...	4·73	...	5·92	...	...	...	3·55	...	...	1·18	2·37	...	2·37	1·18	21·30	16·57
Jhansie ...	6,350	8·82	...	3·78	3·78	·79	6·46	·31	4·09	1·26	·79	·79	·15	2·68	·95	35·65	25·83
Nowgong ...	1,866	2·68	...	3·75	3·75	·54	1·07	...	2·14	·54	1·07	·54	...	1·60	2·68	20·36	17·68
Jubbulpore ...	7,343	4·63	·14	6·40	1·23	...	5·58	·95	2·59	·54	·95	1·23	·41	2·31	1·23	28·19	23·56
Saugor ...	8,014	7·99	·75	3·49	1·12	·25	2·00	1·00	5·99	·87	1·00	2·00	·50	2·61	·50	30·07	22·08
Agra and Central India.	48,675	15·94	·37	4·50	3·02	·62	3·02	·92	3·62	·99	·84	1·25	·39	2·18	·82	38·48	22·54
Umballa ...	15,198	5·13	·79	1·51	·46	·20	1·05	·40	2·44	·72	·72	1·32	·20	1·78	·72	17·44	12·31
Phillour ...	889	...	...	2·25	2·25	...	1·12	...	2·25	1·12	...	...	1·13	...	1·13	11·25	11·25
Jullundur ...	7,882	1·40	·13	3·55	·63	·25	1·65	·13	3·43	·51	·51	1·90	...	1·27	·63	15·99	14·59
Ferozepore ...	8,520	1·76	·12	1·53	1·99	...	·59	·35	1·64	1·41	·47	1·53	·23	1·99	·47	14·08	12·32
Mooltan ...	8,756	...	...	4·11	4·34	·80	1·94	·12	2·17	·68	·23	1·03	...	2·05	1·03	18·50	18·50
Dera Ismael Khan...	1,011	·99	...	·99	4·94	...	...	·99	·99	...	...	...	...	1·98	·99	11·87	10·88
Meean Meer ...	12,385	46·27	·57	5·25	3·96	·48	2·42	·97	3·63	1·05	·97	1·61	·32	2·18	·73	70·41	34·14
Fort Lahore ...	1,382	26·05	·72	3·62	4·34	1·45	5·06	·72	4·34	2·17	1·45	1·45	1·45	3·62	·72	57·16	31·11
Umritsur ...	3,201	19·68	...	4·06	3·12	...	9·37	1·25	4·37	·63	·63	2·50	·63	1·56	·31	48·11	28·43
Sealkote ...	12,487	·80	·24	2·00	·88	·48	·40	...	2.73	·32	·48	1·28	·16	·96	·56	11·29	10·49
Rawul Pindee ...	14,741	·07	·13	2·51	·61	·07	1·90	·47	2·04	1·02	·88	1·36	·27	1·49	·54	13·36	13·29
Campbellpore ...	2,997	...	·33	3·34	1·34	·66	...	·33	1·00	·33	2.00	1·34	...	3·00	2·00	15·67	15·67
Attock ...	1,584	...	...	2·53	5·05	...	2·53	...	3·16	...	1·89	1·26	...	·63	·63	17·68	17·68
Nowshera ...	6,426	·93	·31	2·65	3·27	·31	1·24	·15	1·40	·93	·78	1·09	·47	1·87	·47	15·87	14·94
Peshawur ...	18,870	24·75	...	4·77	1·91	·37	2·23	·37	2·33	·69	·85	1·06	·21	1·48	·58	41·60	16·85
Punjab ...	146,697	8·89	·21	2·99	1·73	·28	1·98	·53	2·57	·89	·85	1·43	·25	2·00	·64	25·24	16·35
Darjeeling ...	2,792	·36	...	1·07	...	...	1·44	1·07	1·07	1·07	·72	...	1·07	1·07	·72	9·66	9·30
Dugshaie ...	6,716	...	...	1·34	·15	...	3.13	1·04	1·04	1·04	·59	1·49	·15	3·13	·30	13·40	13·40
Subathoo ...	6,700	5·22	...	3·88	·30	...	3.28	1·49	1·79	·75	·60	·75	·15	1·64	·15	20·00	14·78
Kangra ...	862	...	...	3·48	...	...	3·48	...	3·48	...	1·16	2·32	...	1·16	2·32	17·40	17·40
Road-making Detachments ...	2,320	...	...	1·29	...	...	·43	...	...	...	1·29	·43	3·88	·86	...	8·18	8·18
Hill Stations...	19,390	1·86	...	2·27	·16	...	2·63	1·08	1·23	·77	·72	·93	·72	1·96	·36	14·70	12·84
Bengal Presidency	390,678	9·24	·34	3·58	2·15	·48	2·72	·75	3·31	·99	·98*	1.73	·24	2·32	1·15	29·98	20·74

* Including sudden deaths out of hospital.

Similar statement for Madras.

100. The following is a similar statement for Madras :—

European Army of the Madras Presidency, 1860 *to* 1869.

STATIONS.	Strength.	Died per 1,000 of Strength from the chief causes of Mortality. Cholera.	Smallpox.	Fevers.	Heat Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Respiratory diseases.	Heart diseases.	Phthisis Pulmonalis.	Wounds and Accidents.	All other causes.	Died out of Hospital.	Average Annual Death-rate. All causes.	Excluding the Cholera rate.
Bangalore...	15,047	1·99	0·13	1·86	0·26	0·40	1·51	0·19	2·33	0·46	0·99	0·66	0·40	1·60	1·99	14·77	12·78
Kamptee ...	10,946	5·39	0·27	1·46	0·91	0·18	1·18	0·27	2·19	0·55	0·46	0·64	1·46	1·28	2·28	18·52	13·13
Bellary ...	9,609	3·42	...	2·39	0·62	0·21	1·87	0·52	1·14	0·21	0·52	0·83	0·73	1·25	2·08	15·79	12·37
Secunderabad	25,984	1·73	0·04	2·11	0·38	0·41	4·04	0·66	7·66	0·77	0·96	1·26	1·11	2·00	2·11	25·24	23·51
St. Thomas Mount ...	3,579	1·39	0·28	1·39	1·39	1·39	2·79	0·55	4·47	0·55	1·39	1·94	1·94	2·52	0·55	22·54	21·15
Rangoon ...	8,879	0·34	...	2·14	0·45	0·34	2·25	0·11	1·80	...	0·22	1·01	0·91	1·35	2·25	13·17	12·83
Madras ...	9,198	4·46	...	1·74	0·76	0·76	0·87	1·08	2·72	0·65	0·97	1·95	0·43	2·05	2·72	21·16	16·70
Tonghoo ...	5,212	0·77	...	4·03	0·57	0·57	2·11	...	2·30	0·38	0·57	0·57	0·96	0·96	2·49	16·28	15·51
Thayetmyo..	4,554	7·90	...	3·51	1·32	...	1·98	1·10	2·19	...	0·21	0·66	1·98	3·08	4·39	28·32	20·42
Cannanore...	7,139	0·70	...	0·70	...	0·70	2·10	0·56	2·52	0·84	0·98	0·84	0·28	1·96	2·52	14·70	14·00
Calicut ...	828	...	...	...	...	...	1·21	1·21	2·41	1·21	...	1·21	2·41	...	2·41	12·07	12·07
Malliapooram	1,088	...	...	...	0·92	0·92	0·92	...	2·75	...	...	...	0·92	0·92	6·43	13·78	13·78
Trichinopoly	2,408	2·08	...	...	0·41	0·41	2·08	0·41	2·08	...	2·08	0·41	0·41	1·24	2·91	14·52	12·44
Port Blair...	538	...	...	1·86	...	...	...	...	7·43	...	...	...	...	1·86	1·86	13·01	13·01
Seetabuldee	181	16·58	5·52	5·52	5·52	11·05	5·52	...	5·52	...	...	11·05	5·52	11·05	5·52	88·37	71·79
Singapore ...	747	...	...	1·34	...	...	1·34	...	...	...	4·01	1·34	...	1·34	...	9·37	9·37
Palaveram...	398	17·59	...	2·51	2·51	...	...	...	5·02	...	2·51	2·51	5·02	5·02	10·05	52·74	35·15
Penang ...	265	...	...	...	3·77	...	...	...	...	...	...	7·55	...	3·77	3·77	18·86	18·86
Waltair ...	424	...	2·36	4·72	...	...	4·72	2·36	2·36	...	...	...	...	2·36	...	18·88	18·88
Masulipatam	193	56·99	...	15·54	...	...	...	5·18	10·36	...	5·18	10·36	...	...	20·72	124·33	67·34
Jaulnah ...	338	2·96	...	...	...	...	...	2·96	...	...	2·96	...	2·96	2·96	...	14·80	11·84
DEPOTS.																	
Poonamallee	2,014	0·99	0·99	0·49	1·48	1·98	10·92	2·47	10·43	0·99	4·96	11·91	3·46	12·40	2·97	66·44	65·45
Wellington...	5,376	0·74	...	2·78	0·18	0·56	2·60	0·74	1·11	0·74	0·56	0·37	0·37	4·28	1·11	16·14	15·40
Ramandroog	548	5·47	...	1·83	...	1·83	...	...	7·30	1·83	3·65	1·83	...	5·47	1·83	31·04	25·57
Chindwarrah	255	...	...	13·33	...	...	...	...	4·44	4·44	4·44	4·44	...	13·33	8·89	53·31	53·31
TOTAL ...	1,15,748	2·56	0·09	2·01	0·55	0·48	2·41	0·55	3·61	0·52	0·89	1·23	0·95	2·09	2·33	20·27	17·71

101. The monthly mortality at the different stations of the Bombay Presidency is here shown for the same period.

A similar statement for Bombay.

European Army of the Bombay Presidency, 1860 *to* 1869.

STATIONS.	Strength.	Died per 1,000 of Strength from the chief causes of Mortality.														Average Annual Death-rate.	
		Cholera.	Small-pox.	Fevers.	Heat Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Wounds and Accidents.	All other causes.	Died out of Hospital.	All causes.	Excluding the Cholera rate.
Bombay ...	4,650	5·81	...	2·77	·43	·86	5·38	2·80	4·52	·86	1·08	5·38	·43	4·30	2·15	36·77	30·96
Surat ...	120	25·	...	8·33	...	...	8·33	...	...	...	...	...	...	8·33	...	49·99	24·99
Deolalee ...	932	10·73	...	5·36	...	1·07	1·07	...	2·14	...	...	1·07	...	4·29	1·07	26·80	16·07
Butcher's Island ...	107	...	...	28·04	9·35	...	...	28·04	...	...	...	...	9·35	9·35	...	84·13	84·13
Ahmedabad & Dholiacote	2,894	6·91	...	3·45	·69	·35	1·38	·35	3·80	·35	·69	1·04	1·38	·69	1·38	22·46	15·55
Baroda ...	379	94·89	...	5·29	2·64	...	...	2·64	2·64	2·64	2·64	...	15·84	5·29	7·92	142·43	47·54
Teethul and Bulsar ...	59	...	...	...	...	...	16·95	...	33·90	...	...	16·95	...	...	...	67·80	67·80
Deesa ...	8,318	3·73	·12	3·73	·72	·48	1·32	·60	1·56	·12	·84	1·20	1·80	·60	1·20	18·02	14·29
Mount Aboo	810	...	...	6·17	...	...	2·47	2·47	2·47	1·23	...	4·94	2·47	11·11	2·47	35·80	35·83
Belgaum ...	9,869	·20	·20	1·02	...	·10	1·62	·20	2·33	·20	·61	·81	·30	1·72	·91	10·22	10·02
Rairee ...	43	...	...	...	...	...	46·51	...	...	...	...	...	...	93·02	..	139·53	139·53
Aden ...	5,657	2·30	...	4·07	1·06	·53	·35	·71	2·12	·89	·53	2·12	2·30	2·48	2·30	21·76	19·46
Poona ...	18,952	2·16	·21	1·89	·21	·26	2·06	·48	2·32	·63	·37	·2	·37	2·06	1·28	16·30	14·14
Kirkee ...	4,810	3·53	...	2·27	...	·42	·84	...	·84	·21	·42	·63	1·25	·21	1·25	11·87	8·34
Khandalla...	734	1·36	...	...	...	...	9·54	6·81	12·27	1·35	8·17	4·09	...	6·81	1·36	51·76	50·40
Sattara ...	1,638	2·44	...	1·83	·61	1·22	1·12	...	1·22	1·22	...	·61	·61	·61	2·44	14·03	11·59
Ahmednugger ...	4,930	5·88	...	1·42	1·62	·61	·81	1·83	1·42	·61	·20	...	·41	1·22	·61	16·64	10·76
Asseerghur..	982	4·07	...	3·05	3·05	1·02	2·04	1·02	3·05	1·02	...	...	1·02	...	...	19·34	15·27
Poorundhur	735	5·44	...	...	1·36	...	2·72	1·36	2·72	1·36	4·08	1·36	...	2·72	1·36	24·48	19·04
Maunder Deo	176	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sholapore ...	921	...	...	3·26	...	...	2·17	...	2·17	...	2·17	...	4·34	3·26	...	17·37	17·37
Mhow ...	12,667	2·76	·47	3·	·24	·32	1·07	·71	1·97	1·34	·78	1·02	·63	2·28	1·18	18·67	15·91
Indore ...	867	2·31	...	2·31	1·15	1·15	3·46	1·15	...	...	1·15	...	...	2·31	1·15	16·14	13·83
Nusseerabad	8,663	12 80	·35	5·77	·46	·46	2·65	·81	3·	·92	·58	·46	·81	1·85	1·04	31·96	19·16
Neemuch ...	4,186	21·02	·47	6·93	·95	·47	1·67	·95	5·40	·95	·24	·71	·95	3·11	1·43	45·25	24·23
Ajmere ...	488	6·15	2·05	...	2·05	...	2·05	...	2·05	2·05	...	...	...	...	2·05	18·45	12·30
Tarraghur...	142	21·13	...	7·04	...	. .	...	...	14·08	...	7·04	...	...	28·17	...	77·46	56·33
Kurrachee...	10,243	1·07	...	3·03	·39	...	1·76	·49	1·85	1·66	·97	2·54	1·66	2·44	1·56	19·42	18·35
Ghizree ...	554	5·41	...	9·03	...	...	...	...	10·83	...	5·41	3·61	...	9·03	3·61	46·03	41·52
Hyderabad...	3,483	·28	...	1·15	1·43	1·15	·86	...	·86	...	1·15	·28	3·73	·57	2·01	13·47	13·19
On march...	4,299	10·47	...	1·63	·70	·23	·93	1·65	2·79	·93	...	1·86	2·56	2·32	3·02	29·09	18·62
BOMBAY PRESIDENCY	1,13,308	4·80	·17	2·95	·53	·38	1·86	·79	2·44	·77	·71	1·47	1·12	2·05	1·42	21 46	16·66

The Local European Troops are included in this return from 1862, the date of their transfer to the British Service.

Comparison of the statistics of sickness in the three Presidencies during the ten years.

102. The general result of these statistics for the three Presidencies may be conveniently seen in the annexed statement. As regards the proportion of men constantly sick, Bombay gives the most favorable return, 59·8 per 1,000; Madras comes next with 62·0, and Bengal stands highest, 67·1 per 1,000. In Bengal the ratio which is at a minimum of 54·8 in December is at a maximum of 79·2 in September. In Madras the minimum 56·9 is in February and the maximum 67·9 in September. Bombay, with a minimum of 52·6 in January and again in April, gives a maximum of 72 in October. The admission rate can as yet be shown only for Bengal. The annual average was 1754·9, of which the smallest proportion, 99, occurred in February and the largest, 181, in October.

Statement showing the comparative sickness in the European Armies of Bengal, Madras, and Bombay during the ten years 1860 *to* 1869.

PRESIDENCY.	Total Strength for the period.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Average annual ratio.
		Daily sick per 1,000 of Average Strength.												
Bengal ...	390,678	57·7	58·8	61·2	64·9	69·2	70·5	72·7	76·3	79·2	74·4	64·3	54·8	67·1
Madras ...	115,748	59·4	56·9	58·4	57·5	60·5	60·6	64·4	65·4	67·9	65·9	65·3	61·2	62·0
Bombay ...	113,308	52·6	54·2	53·3	52·6	55·6	55·8	59·	69·9	70·3	72·	65·1	57·3	59·8
		Admissions into Hospital per 1,000 of Average Strength.												
Bengal ...	390,678	114·1	99·0	118·6	145·5	149·3	151·2	170·3	177·3	172·3	181·6	150·8	123·1	1754·9
Madras ...	115,748	Not yet received.												
Bombay ...	113,308	Not yet received.												

In Bengal the constant sick rate at Darjeeling 39·4, at Kangra 41·8, Campbellpore 44, and Jullundur 46, contrast favorably with 70·6 at Fort William, 84·5 at Benares, and 98·5 at Delhi, the maximum attained in this Presidency. In Madras, Malliapooram gives 36, Calicut 41·2, Bangalore and Port Blair each 49·3; the highest ratio excluding very small bodies of men was at Saint Thomas Mount, 77. In Bombay, Indore shows only 31·7, Hyderabad 39·9, Deesa 42·4. The largest proportion of daily sickness in this Presidency was at Bombay itself, where the rate equalled 78·7, considerably in excess of what it was either at Calcutta (70·6) or at Madras (67·6).

Comparison of the statistics of mortality in the three Presidencies for the ten years.

103. As regards mortality, Bengal contrasts most unfavorably with the other Presidencies, giving an average death rate for the ten years of 29·98 per 1,000, compared with 21·46 in Bombay and only 20·27 in Madras. Great portion of the excessive loss is to be ascribed to cholera, which caused an

annual average of 9·24 deaths per 1,000 in this Presidency, compared with 4·80 in Bombay and 2·56 in Madras; but even excluding the cholera rate, Bengal with 20·74 still occupies the lowest place, then comes Madras with 17·71, the returns from Bombay, 16·66, being the most favorable of all. The higher death rate of Bengal is due, as has been already stated, mainly to cholera, but Fevers and heat Apoplexy both have had a marked influence in the result. Dysentery has also been more fatal than in the other Presidencies; but Hepatitis, although causing a larger proportion of mortality than in Bombay, shows a somewhat smaller ratio of loss in Bengal than in Madras. The details under each head may be conveniently seen in the annexed abstract of the general statement.

Statement showing the comparative mortality in the European Armies of Bengal, Madras, and Bombay during the ten years 1860 *to* 1869

PRESIDENCY.	Average Strength for the ten years.	DEATH RATE PER 1,000 FROM THE CHIEF CAUSES OF MORTALITY.														AVERAGE ANNUAL DEATH RATE	
		Cholera.	Smallpox.	Fevers.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	es.			ds and Accidents.		Died out of Hoal, 186	All causes.	Excluding the Cholera rate.
Bengal	390,678	9·24	·34	3·58	2·15	·48	2·72	·75	3·31	·99	·98	1·73	·24	2·32	1·15	29·98	20·74
Madras	115,748	2·56	·09	2·01	·55	·48	2·41	·55	3·61	·52	·89	1·23	·95	2·09	2·33	20·27	17·71
Bombay	133,308	4·80	·17	2·95	·53	·38	1·86	·79	2·44	·77	·71	1·47	1·12	2·05	1·42	21·46	16·66

The changes in the constitution of regiments during their Indian service will be discussed more particularly by Dr. Bryden in the Appendix.

104. In 1867, under the orders of the Government, a series of forms was devised with a view of recording the changes in the constitution of regiments which took place during their tour of Indian service. These statements, which were to be filled in by each corps on leaving the country, were designed to show the strength on its first arrival, with details of constitution according to age and service, the changes which had occurred, the causes to which they had been due, and full particulars regarding the survivors of the original strength who remained with their regiments on leaving India. A number of these returns have now been received; some of them are inaccurate, and others are necessarily incomplete, because they concern corps which belonged to the old Local Army. Those which are calculated to convey accurate information have been selected, and the results will be appropriately considered by Dr. Bryden in his memorandum on the influence of age and the effects of Indian service, to which allusion has already been made.

The death rate among women has been considerably under the average of the last ten years.

105. Having now discussed the vital statistics of the men, I shall briefly consider the chief facts relating to sickness and mortality among the women and children. Out of an average strength of 3,519 women, the constant sick rate equalled 49·5 and the admissions 1143·5 per 1,000. Many cases of sickness, however, are treated in quarters, and cases of childbirth are no longer reckoned as admissions into hospital. For these reasons the ratios of sickness fall short of the truth. The death rate was 32·68 per 1,000, a ratio considerably in excess of that for the men. Fevers, Phthisis, Cholera and the affections attendant on child-bearing were the chief causes of mortality. Although high, the loss of 32·68 per 1,000 is much lower than the average of the last ten years, which has equalled 43·31. The annual ratio has varied from 25·46 in 1866 and 31·6 in 1868, the only two years which show more favorable results than 1870, to a maximum of 68·03 in 1861. The distribution of the deaths among women in 1870 according to stations is shown in Table III of this series. The details of admissions and causes of deaths, both among women and children, appear in No. VII.

The mortality among children, although very high, was lower than that of former years.

106. Among children, the cases of illness which were treated in hospital equalled 818 per 1,000, and the constant sick rate 42; but as very many have attendance in quarters, these ratios do not represent by any means the whole sickness of the year. Out of an average strength of 5,644, four hundred

and sixty-one died, or a proportion of 81·68 per 1,000. Arranged in the order in which they contributed to this high death rate, the chief diseases stand as follows:—Diarrhœa 17·89, Anœmia and Atrophy 12·23, Convulsions 9·39, Dentition 8·86, Remittent and Continued Fevers 8·86, Intermittent Fevers 5·67. The other causes show comparatively small ratios, in no case amounting to 4 per 1,000. The distribution of the deaths by stations and the diseases to which they were due are detailed in Table IV. The mortality, although lamentably high, is lower than that of any of the previous ten years, excepting 1863, 1864, and 1866, in which it was respectively 78·02, 71·36, and 75·11. In 1860 it was 102·64, and in 1869 it equalled the enormous ratio of 145·22. For the ten years it averaged 94·90.

Details of deaths among children in 1870 according to age.

107. For the first time the deaths among children can be shown according to age, and the details are given in the annexed statement.

Statement showing the strength of European children on the 1st April 1870, and ratio of deaths per 1,000 at different ages during that year.

AGES.	TOTAL		Ratio per 1,000.
	Strength.	Deaths.	
Under 6 months	386	117	303·11
Between 6 " and 1 year ...	450	100	222·22
" 12 " " 18 months ...	422	82	194·31
" 18 " " 2 years ...	409	52	127·14
" 2 years " 3 " ...	561	48	85·56
" 3 " " 4 " ...	554	13	23·47
" 4 " " 5 " ..	521	16	30·71
" 5 " " 6 " ...	500	10	20·00
" 6 " " 7 " ...	408	4	9·80
" 7 " " 8 " ...	371	5	11·29
" 8 " " 9 " ..	287	2	
" 9 " " 10 " ..	234	2	
" 10 " " 11 " ...	182	1	
" 11 " " 12 " ...	139	2	
" 12 " " 13 " ...	134	3	
" 13 " " 14 " ...	93	1	
" 14 " " 15 " ...	66	1	
Upwards of 15 years ...	46	None.	
TOTAL STRENGTH ON 1ST APRIL 1870 ...	5,763	459	79·65

Comparison of the death rate among children in Bengal and in England.

108. As the ratios are calculated on the strength as it stood on the 1st April, and not on the average strength of the year, the results do not altogether correspond with the figures already given, but the difference is very trivial. The excessive death rate among very young children which this statement reveals is very lamentable. Of infants under six months nearly one-third died. In the second six months of life the loss exceeds one-fifth, and again during the third it was little less than a fifth. In the fourth half-year the ratio has diminished to 127·14; between two and three years it has fallen to 85·56, and then it rapidly declines. I have not been able to procure statistics of child life in England, with which these figures may be properly compared, but arranged in five-year periods, the results stand thus:—

AGES.	DEATHS PER 1,000.		
	ENGLAND.*		Bengal Presidency.
	Males.	Females.	
Under 5 years of age	72·57	62·60	148·10
Five, and under 10 years of age .	8·87	8·76	17·73
Ten, and under 15 years of age ..	4·98	5·14	11·51

* The means of 29 years—1838 to 1866—taken from the Registrar General's Report for 1866.

The mortality of European children in the Bengal Presidency in 1870 was thus rather more than double the mean mortality of children of the same ages in England.

Statistics of mortality among officers from 1860 to 1869.

109. Arrangements have now been completed for obtaining annual statistics of the mortality
returns of sickness among officers would be imperfect and of little value.
General of the Army, and which is here given, although it may not be

Statement of deaths among the Officers of Her Majesty's British and Indian Armies

	Years.	Strength in India, whether on leave or not, on 1st July in each year.	Deaths of each year.																															
			Died in India, but cause of death not given.	Died in India and cause of death stated.	Abscess.	Amentia.	Amputation.	Aneurisms.	Apoplexy.	Ascites.	Asthma.	Asthenia.	Atrophy.	Bowel complaint.	Bronchitis.	By a fall.	Cancer in the tongue.	Carbuncle on the neck.	Cerebral Hæmorrhage.	Cholera.	Constitutional Irritation.	Consumption.	Convulsions.	Cystitis.	Delirium Tremens.	Diarrhœa.	Debility.	Diphtheria.	Disease of the throat.	Disease of the kidney.	Disease of the brain.	Dropsy.	Drowned.	Dysentery.
Her Majesty's British Army.	1860	1,416	6	12												1				2		1									1			
	1861	1,500	18	16												1				9													3	
	1862	1,920	3	15												2				5		1												2
	1863	1,827	4	30					2		1				1	1				2					1	1				1	1		1	1
	1864	1,837	9	24					2					1	1	2									1	1	1							
	1865	1,731	3	29				1	2		1			1		1				1								1			3			2
	1866	1,725	7	19					1						1					4													1	2
	1867	1,757	5	33			1		2											10					2	2					1		2	1
	1868	1,702	4	25					1			1				2				4		1				1							2	1
	1869	1,815	3	26					3											4											1	1		2
Her Majesty's Indian Army.	1860	2,260	13	22												1				4	1				2						1			1
	1861	2,303	28	6					1											1											2		1	
	1862	1,901	6	22														1		5		4									2		1	2
	1863	1,666	10	20				1	1				1				1					1									3			
	1864	1,657	6	16					1						1					2		1			1								1	1
	1865	1,600	10	23					2							1			1	4		1							1		1			1
	1866	1,535	6	12					2			1								1			1	1							2			1
	1867	1,527	9	20	1															5											1	1	1	
	1868	1,518	9	9		1														1					1									
	1869	1,371	7	21					2	1		1				1				4					1									1

among officers, and an attempt has also been made to collect such data for previous years. Any
The statement of deaths in the years from 1860 to 1869, which has been received from the Adjutant
absolutely correct, contains much interesting information which has never been collected previously.

serving in the Presidency of Bengal during the years 1860 *to* 1869, *inclusive.*

IN INDIA. CAUSE OF DEATH.																																											OUT OF INDIA.		
Dyspepsia.	Encephalitis.	Enteritis.	Epilepsy.	Erythismus Tropicus.	Fever.	Fractured cranium.	Accidental gunshot wound.	Heart disease.	Hepatitis.	Hydrophobia.	Icterus and Eclampsia.	Jaundice.	Killed in action.	Killed by explosion of a magazine.	Lockjaw.	Leprosy.	Meningitis acuta.	Muco-Enteritis.	Nephria.	Paralysis.	Pericarditis.	Phthisis.	Pharyngitis.	Pleurisy.	Pneumonia acuta.	Poisoned.	Pyœmia.	Renal disease.	Rupture of blood-vessel.	Small-pox.	Suicide.	Sunstroke.	Syphilis.	Tonsilitis.	Typhoid fever.	Ulcers.	Uræmia.	Vomiting blood.	Vulnus Incisum.	From the bite of a tiger.	From wounds received in action.	From wounds at the hands of an assassin.	Strength in Europe or beyond sea on 1st July, whether on furlough or sick leave.	Deaths reported from England of officers whose battalions are serving in India.	Died at sea.
...	...	...	1	...	5	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	213	1.	1
...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	251	1	.
...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	349	1	2
...	...	...	...	...	2	...	...	1	3	...	...	...	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	342	3	2
1	...	...	...	...	5	...	1	2	1	...	...	1	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	381	6	1
...	...	...	...	...	5	...	1	1	3	...	...	...	1	...	...	...	...	1	...	...	...	...	1	...	...	1	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	374	6	1
...	...	...	...	...	4	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	443	8	1
...	...	...	...	...	3	...	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	4	...	...	...	1	...	...	...	395	4	...
...	2	1	...	...	2	...	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	...	...	...	...	...	...	...	...	...	...	357	7	2
...	...	...	...	...	4	...	...	...	3	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	2	1	...	...	...	1	...	...	1	...	1	...	...	303	5	5
...	...	...	1	1	3	...	...	...	3	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...	...	...	...	...	...	...	...	...	...	...	594	13	8
...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	437	9	3
...	...	...	...	...	3	...	...	1	2	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	209	6	3
...	...	...	...	...	1	...	...	...	3	...	1	...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	309	7	5
...	...	...	1	...	3	...	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	231	7	6
...	...	...	...	...	2	...	...	2	1	...	...	...	1	...	...	...	...	...	...	1	...	...	...	1	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	327	7	3
...	...	...	...	...	2	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	361	7	2
...	...	...	...	...	1	1	...	3	3	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	335	5	2
...	...	...	...	...	1	...	...	3	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	285	8	3
...	...	...	...	...	2	...	...	1	3	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	382	3	.

It would appear at first sight that there must be some material error in this statement, as, although the European Army has gradually and largely diminished from 1860, the strength of officers has increased; but on referring to the Adjutant General on this point, I find that in the earlier years the strength of officers in the new line regiments, artillery and engineers, late of the Company's Army, was not included, and it will be seen that while the number of officers in Her Majesty's British Army, as shown in the first half of the table, has somewhat increased, the number in Her Majesty's Indian Army as shown in the second half has much diminished.

110. The general results of these figures may be seen in the following statement:—

The general death rate of officers from 1860 to 1869, as shown by these returns.

Abstract of Statement of Deaths among Officers during the ten years 1860 *to* 1869.

	YEAR.	STRENGTH ON THE 1ST JULY IN EACH YEAR.			DEATHS.			Ratio of Deaths per 1,000 of Strength.	REMARKS.
		In India.	Out of India.	TOTAL.	In India.	Out of India.	TOTAL.		
H. M.'s British Army...	1860 ...	1,416	243	1,659	18	2	20	12·06	
	1861 ...	1,500	251	1,751	34	1	35	19·99	
	1862 ...	1,920	349	2,269	18	3	21	9·25	
	1863 ...	1,827	342	2,169	34	5	39	17·98	
	1864 .	1,837	381	2,218	33	7	40	18·03	
	1865 ...	1,731	374	2,105	32	7	39	18·53	
	1866 ...	1,725	443	2,168	26	9	35	16·14	
	1867 ...	1,757	395	2,152	38	4	42	19·52	
	1868 ...	1,702	357	2,059	29	9	38	18·45	
	1869 ...	1,815	303	2,118	29	10	39	18·41	
TOTAL ..	...	17,230	3,438	20,668	291	57	348	16·84	
H. M.'s Indian Army...	1860 ...	2,260	594	2,854	35	21	56	19·62	
	1861 ...	2,393	437	2,830	34	12	46	16·25	
	1862 .	1,901	209	2,110	28	9	37	17·53	
	1863 ..	1,666	309	1,975	30	12	42	21·26	
	1864 ...	1,657	321	1,978	22	13	35	17·69	
	1865 ...	16,000	327	1,927	33	10	43	22·31	
	1866 ...	1,535	361	1,896	18	9	27	14·24	
	1867 ...	1,527	335	1,862	29	7	36	19·33	
	1868 ...	1,518	285	1,803	18	11	29	16·08	
	1869 ...	1,371	382	1,753	28	3	31	17·68	
TOTAL ...	...	17,428	3,560	20,988	275	107	382	18·20	
GRAND TOTAL ...	...	34,658	6,998	41,656	566	164	730	17·52	

It will be observed that in Her Majesty's British Army the death rate among officers has varied from a minimum of 9·25 to a maximun of 19·99, the average annual ratio of mortality for the ten years having been 16·84. Among the officers of Her Majesty's Indian Army the general average, 18·20, is somewhat higher, while the annual results fluctuate between 14·24 and 22·31. Taking the two bodies of officers together, the general annual ratio averages 17·52.

Statistics of officers in 1870.

111. The deaths among officers of Her Majesty's British Army serving in India, as shown in the annual regimental returns, give the following results:—

Statement showing the Strength and Deaths, in and out of India, of the Officers of British Regiments during the year 1870.

		IN INDIA.															OUT OF INDIA.	
		CAUSES OF DEATHS.																
Strength in India (whether on leave or not) on 30th June.	Total Deaths during the year.	Cholera.	Intermittent Fever.	Remittent Fever.	Enteric Fever.	Intestinal Hæmorrhage.	Hepatitis.	Apoplexy.	Encephalitis from old injury.	Softening of brain.	Phthisis Pulmonalis.	Asthma.	Aneurism of Aorta.	Dilatation of Heart.	Gunshot wound, accidental.	Suicide.	Strength in Europe or beyond Sea on 30th June (whether on furlough or sick leave).	Deaths reported from England of Officers whose Battalions are serving in India.
1,566	22	2	1	2	3	1	2	1	1	1	1	1	1	1	2	2	302	8

Out of a strength of 1,868 officers of Her Majesty's British regiments serving in Bengal 30 died, giving a death rate of 16·06 per 1,000.

Regarding the officers of Her Majesty's Indian Army in 1870, the following statement has been received from the Adjutant General of the Army:—

Statement of Deaths among Officers of Her Majesty's Indian Army during the year 1870.

	IN INDIA.												OUT OF INDIA.		
			CAUSE OF DEATH.												
STRENGTH ON 1st JULY 1870.	Died in India, but cause of death not stated.	Died in India, and cause of death stated.	Cholera.	Hepatitis	Fever.	Dysentery.	Dropsy.	Apoplexy.	Suicide.	Diphtheria.	Congestion of Brain.	By a fall from his Horse.	Number on Medical Certificate or furlough to Europe.	Died in Europe.	Died at Sea.
1,370	8	15	1	4	2	1	1	1	2	1	1	1	426	5	1

Out of a total strength of 1,797 there were altogether 29 deaths, or a ratio of 16·31 per 1,000. Compared with the mortality of previous years these statistics are favorable.

The general results of mortuary registration in Cantonments.

112. The registration of deaths in the several military cantonments has been continued during 1870, and the following statement shows the general results for the year. The ratios of mortality in each cantonment have not been entered because in many instances the population is not known, and the returns of deaths have been by no means accurate.

CANTONMENTS	Average strength of the resident population.	CAUSE OF DEATH.						Total Deaths of the Year.
		Cholera.	Small-pox.	Fever.	Bowel Complaint.	Injuries.	All other Causes.	
Chinsurah ...	300	...	..	3	3	.	..	6
Fort William ...	380			.	.	...	1	1
Alipore ...	269	1	.	2	3	..	3	9
Dum-Dum ...	7,320	9	1	2	...	.	2	14
Barrackpore ...	8,416	17	...	31	4	2	16	70
Berhampore (11 months) ...	1,120	15	...	26	2	1	3	47
Dacca ...	152	1	...	...	3	...	4	8
Shillong ...	730	...	...	2	...	...	1	3
Gowhatty ...	316	1	..	1	.	...	...	2
Cachar ...	258	...	...	3	2	..	2	7
Debrooghur ...	1,180	2	...	10	...	...	15	27
Buxa-Dooar ...	453	.	..	3	4	1	10	18
Julpigoree (11 months) ...	323	...	...	...	...	..	1	1
Bhaugulpore ...	156	...	...	...	...	...	...	...
Darjeeling ...	344	...	...	...	...	...	3	3

CANTONMENTS.	Average strength of the resident population.	Causes of Death.						Total Deaths of the Year.
		Cholera.	Small-pox.	Fever.	Bowel Complaint.	Injuries.	All other Causes.	
Hazareebaugh	179	...	...	3	...	...	...	3
Dinapore	16,210	47	3	49	23	4	40	166
Segowlie	386	...	...	12	...	3	13	28
Benares	4,998	6	...	43	7	...	22	78
Chunar	424	1	...	...	...	2	15	18
Goruckpore	1,014	..	...	4	1	1	12	18
Fyzabad	5,005	14	...	6	6	1	18	45
Rae Bareilly (10 months)	1,090	...	...	3	3	...	10	16
Lucknow	16,920	2	1	75	3	1	81	163
Seetapore	4,144	...	...	27	2	5	18	52
Futtehghur	7,716	...	...	64	1	1	11	77
Cawnpore	30,933	...	...	94	5	...	38	137
Banda	739	...	...	19	1	...	4	24
Allahabad	3,000	1	...	25	3	4	11	44
Nagode	2,465	...	...	8	...	...	32	40
Shajehanpore	5,456	1	22	48	12	1	10	94
Bareilly	3,207	...	...	43	20	3	1	67
Moradabad	530	...	...	...	...	...	...	...
Raneekhet	...	...	..	8	5	1	14	28
Almorah	736	...	...	4	3	...	4	11
Nynee Tal	...	...	...	10	1	1	3	15
Landour	1,383	...	...	1	...	...	8	9
Chuckrata	2,488	...	...	25	2	4	7	38
Deyrah	1,798	...	...	3	1	...	2	6
Roorkee	1,220	...	...	23	2	...	8	33
Meerut	35,194	2	5	394	5	1	377	784
Delhi	...	..	...	169	3	3	129	304
Muttra	4,119	...	...	35	6	...	12	53
Agra	20,341	...	...	169	63	3	111	346
Morar	6,139	...	..	110	9	4	21	141
Seepree (7 months)	1,983	...	...	10	1	...	7	18
Jhansi	3,165	...	1	41	6	1	13	62
Nowgong	5,099	...	...	59	5	...	56	120
Saugor	15,523	...	...	197	15	8	108	328
Jubbulpore	15,474	...	...	226	26	3	69	324
Umballa	24,560	...	40	257	71	16	172	556
Dugshaie	1,762	...	...	19	2	...	12	33
Kussowlie	1,297	..	1	21	4	1	17	44
Subathoo	4,534	...	...	47	5	...	15	67
Jutogh	404	...	...	1	...	...	1	2
Jullundur	11,069	...	4	137	...	2	67	210
Ferozepore	14,345	...	...	164	...	1	82	247
Jhelum	1,687	...	...	32	8	2	24	66
Mooltan	7,647	...	...	65	27	1	29	122
Sealkote	9,750	..	...	62	8	...	19	89
Kangra	35	...	...	...	...	1	...	1
Dhurmsalla	1,059	...	...	15	3	...	3	21
Bukloh	629	...	...	5	...	...	7	12
Umritsur	...	...	...	...	...	...	...	...
Fort Lahore	86	...	...	...	...	1	2	3
Meean Meer	8,462	...	...	131	24	1	37	193
Rawul Pindee	7,140	...	...	276	39	7	31	353
Campbellpore (7 months)	873	...	...	1	...	...	1	2
Tullagunge	994	...	...	1	...	...	2	3
Attock	498	...	...	1	1	...	...	2
Murree	437	...	...	2	...	1	...	3
Nowshera	2,864	...	...	76	5	2	22	105
Peshawur	13,526	...	...	237	34	5	86	362
Murdan	1,643	...	...	19	11	2	33	65
Abbottabad		...	...	3	18	2	16	39
Kohat	2,338	...	...	34	7	3	48	92
Bunnoo	1,768	...	...	32	13	8	31	84
Dera Ghazee Khan	1,329	...	...	25	6	...	22	53
Dera Ismael Khan	2,019	...	...	8	9	..	19	36
Rajanpore	2,300	...	...	14	7	2	12	35
TOTAL	...	120	78	3,775	563	117	2,156	6,800

A new form of register for cantonments should be introduced from 1872.

113. Considerable difference of procedure appears to obtain with reference to these cantonment death returns. In some of the provinces the results are tabulated with those of the general population; in others they are kept distinct. In some cases all the deaths in cantonments, no matter whether Native, European, or Eurasian, are included; in others the return is confined to Native camp-followers only. Regarding this matter merely from a theoretical point of view, the simplest method would be to place the registration within cantonments under the local Sanitary Commissioner, who already receives returns from all the other registration circles of the province; but such a plan would inevitably lead to some conflict of authority. The sanitary arrangements of military cantonments are not under the local Sanitary Commissioner. In every important station there are military medical officers with an administrative medical staff, and it is very undesirable that the care of the health of the community should be in any measure transferred from these authorities, who have generally considerable leisure at their disposal; and, added to the innumerable duties which already devolve on the Sanitary Commissioner of the province, who is overburdened with interests affecting many millions of people, it is very desirable that the same mode of procedure should be followed in all cases. The present mortuary return for cantonments is defective, and I propose, when bringing the other matters connected with this question to the notice of the Government, to recommend that a new form should be introduced with the commencement of the coming year.

It has been decided to concentrate the statistics of European soldiers in the three Presidencies.

114. I have already alluded to the importance of concentrating the statistical information in this country, and to the necessity of studying the facts as they concern the whole continent of India. There are special reasons why this method should be adopted with regard to the British Army. The value of full and accurate statistics of the European troops in this country can hardly be over-estimated. Questions constantly arise for the satisfactory settlement of which such data are indispensable, and, whether as regards the extent and causes of sickness, mortality and invaliding, the comparative healthiness of different stations, the effect of age and service, and the many other points which might be noticed, it is of the first importance that the fullest details should from year to year be carefully collected and placed on record. It would be of much advantage if the statistics of Madras and Bombay were prepared in exactly the same forms as those which have now for some years been employed for Bengal. The facts from the three Presidencies could then be satisfactorily compared, the field of observation would be practically much enlarged, and the basis of facts on which any generalizations might be formed would be greatly widened. But in order to attain the best results, the returns must be collected and compiled by one officer specially fitted for the work. In this way one uniform method of calculation can be secured. With a different officer in each Presidency, the same mode of procedure might nominally be followed; and yet there might, and probably would, be slight differences in the details of working, which, although apparently trivial, would materially influence the results.

The changes which improved means of communication have wrought in this country, present an especial and very forcible argument in favor of such a concentration of statistics. A European regiment during its Indian service now-a-days has experience always of two, and generally of all three Presidencies, and to consider its sanitary history in one of them, apart from what it experienced in the other two, is, and must be, most unsatisfactory. Invalids from this country go home, and recruits come out to it, *viâ* Bombay, so that, independent of the changes in relief, the statistics of Bombay have an important bearing on the sanitary history of European soldiers in Bengal. Influenced by those considerations, the Government has now decided that without interfering with the arrangements which already exist in the minor Presidencies, the statistics of the European troops in both of them should be concentrated in the statistical branch of this office.

Further steps have been taken to gain information regarding disease, and to improve the health of the British soldier in India.

115. Having concluded all the remarks which I have to offer on the statistics of the European soldiers, of women, children and officers, and on the various questions which are connected with them, I shall now proceed to state what steps have been taken since the last annual sanitary report was submitted to procure further information regarding the history and causation of disease, and what practical measures have been adopted for improving the health of the British soldier when serving in this country. These two questions are intimately and inseparably associated together, and the truth cannot be too strongly or frequently urged, that accurate knowledge must form the true basis of all sanitary reform.

Measures have been taken to institute a special enquiry into cholera in India.

116. Of all diseases which press heavily on the British soldier in India, perhaps the most important is cholera, because, although it does not add greatly to the sickness, it tells very heavily on the death rate. In order to obtain some more accurate information regarding this disease, several fresh measures have been taken during the past year. The special enquiry into cholera in India, which was devised by the Army Sanitary Commission, has been commenced in this Presidency. The register of cases which was primarily adapted for European regiments has been modified, so as to suit Native regiments, jails and lunatic asylums. When cholera prevails among European troops, the medical officers in charge are so overburdened with anxiety and work, that it would be difficult for them to observe and record all the details prescribed by the Commission; and the Inspector General of Hospitals, Her Majesty's British Forces, has accordingly recommended that in these circumstances additional and specially qualified officers should be deputed for the purpose. For the population generally no such details can be procured, but the mortuary returns will show the daily number of deaths from cholera in each town and village circle, and thus afford much valuable information. Every Civil Surgeon will be furnished with a copy of the "Instructions," so that his attention may be drawn to the many important questions regarding which data should be collected. It has been decided that all the statistics and reports before being transmitted to England should be collected and examined in this country. They will accordingly be forwarded to this office, those regarding European troops being supplied to the Military Department by the Inspector General of Hospitals of Her Majesty's British Forces, those regarding Native troops and prisoners by the Indian Medical Department, and those concerning the general population by the Sanitary Commissioners. No registers have yet been received from hospitals in this Presidency, but a few from Madras and Bombay have been already submitted to the Government with a view to their being forwarded to the Secretary of State.

Monthly statements of cholera are now furnished from all parts of the country.

117. As a part of this enquiry, it has been decided that each of the Sanitary Commissioners should regularly transmit to this office a monthly statement showing the prevalence of cholera in their respective provinces. For 1870 general statements have been received from Madras and Bombay, as well as from several of the local Sanitary Commissioners in this Presidency, and the results are shown in the statistics of cholera among the general population which have been given in a preceding paragraph. During the current year similar monthly statements have been received from all the Sanitary Commissioners. Dr. Moore, the Superintendent General of Dispensaries and Vaccination in Rajpootana, has also been good enough to keep me informed of all the facts relating to cholera, over the large area occupied by these States, which have come to his knowledge. It will thus be seen that from all parts of the country facts are being collected, not only with a view to their being placed on record, but also in order that the current history of cholera may be studied. The statistical information now being collected in Bengal Proper must eventually prove a very valuable addition to the evidence procured from other

quarters. All details regarding cholera within its endemic area and within the districts bordering on this area are of the greatest importance.

The sanitary enquiry in special localities, as recommended in section V of the "Instructions," is about to be commenced in the Central Provinces.

118. The question of how the sanitary enquiries in special districts and localities, which were suggested by the Army Sanitary Commission in the fifth section of their "Instructions," can best be conducted has for some time engaged attention. On this matter the local Sanitary Commissioners were consulted, and the plan of investigation which Dr. Townsend, the Sanitary Commissioner for the Central Provinces, has proposed seems to be the best adapted for the purpose. He thus describes the general features of the scheme:—

In order to elucidate many of the points of enquiry, it is necessary that data should be collected prior to the invasion of the epidemic. It is on this account of great importance that special enquiries of the nature indicated in section V of the "Instructions" should be set on foot in the interval between the disappearance of one epidemic and the invasion of another. With regard to the question as to whether there are any places within the limits of this province which may be classed according to the conditions indicated in the opening paragraph of the section above referred to, I have to remark that, in my opinion, cholera is nowhere endemic in this province, *i. e.*, there is no locality which is not free from cholera for periods varying from two to four years; that, on the other hand, there is no tract of country, excepting perhaps some remote and sparsely inhabited forest tract, which is not subject to occasional visitations of epidemic cholera; but while there is no tract of country that is not liable to visitations of the disease, there will, I believe, be found, even in those tracts in which cholera prevails with the greatest frequency and intensity, a certain proportion of the villages which are not amenable to its attacks, which in every epidemic suffer only in a very slight degree, or experience complete immunity. There is not, I think, a single district in this province in which comparative topographical enquiries, with reference to epidemic cholera, might not be pursued with advantage. There are, however, some districts which, from the large amount of traffic through them, are more subject to be invaded by cholera, and which, from the variety of their topography, offer admirable fields for carrying out the enquiries specified. Of these, the one which, I think, would prove the best field for investigations of the kind is Jabalpúr. There is a great and increasing traffic through it, and whenever cholera is prevalent, some part of the Jabalpúr district is sure to suffer. In the late epidemic it was one of the districts in which cholera first appeared, and during the two epidemic years cholera pervaded the whole district, upwards of 800 towns and villages were visited, and the number of deaths amounted to 9,000, or 15 *per mille* of the population. The topography of the district is extremely varied, the conditions of elevation, nature of rock, soil, cultivation, water-supply, and proportion of forest and open country differ greatly in different localities within short distances of each other; and moreover the geological formation, a knowledge of which is essential to the proper understanding of these varied topographical conditions, and on which the sites of the villages, the drainage, and even the structure of the houses depend, has been accurately surveyed and mapped. Its accessibility and the comparative good facilities that it possesses for moving from one point to another are also greatly in favor of selecting Jabalpúr as a field for sanitary enquiry, and moreover from its being on the line of Railway, other special localities at a considerable distance might be brought within the scope of the enquiry.

In the district of Sagur, cholera prevailed in the last epidemic with greater intensity than in Jabalpúr, and Sagur also has many advantages for carrying out sanitary investigations. Its topography is very varied, and its geological formation has been surveyed, but the traffic through Jabalpúr is much greater, and it is therefore likely to be attacked first, and from its being on the line of Railway, and its internal communications being better, the difficulties in the way of prosecuting enquiries at all seasons of the year will be less. After consideration then of all the above circumstances, I am of opinion that the district of Jabalpúr possesses remarkable advantages for carrying out systematic sanitary investigations.

The investigations might be conducted on the following plan:—In a certain number of localities having well-defined topographical characteristics, a town, and from 10 to 20 villages around it, should be selected and carefully surveyed by the officer conducting the enquiry, with reference to their sites, soil, water-supply, and other points indicated in the "Instructions," and the observations on these points carefully recorded. Enquiries might be carried on with advantage in at least five such circles in the Jabalpúr district. Statistics of the populations of each town and village should be prepared, showing the numbers of each caste, of each sex, and at certain ages. The dates also on which cholera appeared in such of the towns and villages as were visited by the epidemic of 1868 and 1869, and the number of deaths that occurred should also be noted. All information of this kind having been recorded, a Native medical subordinate should be appointed to each circle, whose duty it would be to inspect periodically every part of the town and every village within the circle, and report to the officer conducting the enquiry the state of health of the people and the condition of the water-supply, the depth of the water in the wells, the state of the current in the streams, and other circumstances that vary from time to time. This subordinate would have his head-quarters in the town or principal village of the circle, and he would be furnished with medicines for treating diseases among the people. The nature of his duty would be explained to the owners of the villages, and they would be called upon to assist him. The deaths in the selected villages would, as at present, be reported at the registration station of the circle, but they would be recorded separately in a supplementary register which would be forwarded to the officer conducting the enquiry. To conduct this enquiry, a special health officer should be appointed; it would be his duty to carefully watch the selected circles, and observe the variations in the state of the health of the people in connection with variations in climate, conditions of water-supply, dryness of soil, and supply of food; at the same time he would make himself acquainted with the topographical conditions and the state of the villages throughout the district, and watch the variations in the general health of the population, or this enquiry might be conducted by the Sanitary Commissioner, a junior officer being appointed to assist him. Meteorological observations have been recorded at Jabalpúr during the last two years, but unfortunately many of the instruments have been broken, and it would be necessary to replace them with a standard set. It would also be necessary that the rainfall should be measured in each circle of observation. While this special enquiry is being carried on at Jabalpúr, arrangements should be made for carrying on similar investigations in every sudder station of the province where there is a resident medical officer.

The general scheme has been sanctioned; the details of the arrangements are still under consideration. It is of great importance that these should be provided for as completely as possible, and that the medical officer to be entrusted with the enquiry should be altogether unbiassed in his opinions and free from all preconceived theories on the subject of cholera.

The registers of subsoil water-level, chiefly on account of the absence of cholera, throw no light on Pettenkofer's theory.

119. The registers of subsoil water-level which were commenced in the end of 1869 were continued during 1870, but partly on account of the marked absence of cholera in the Upper Provinces, and partly from other causes, the information which they contain does not assist in forming any conclusions as to the correctness of Professor Pettenkofer's theory. The returns for the past year were analyzed by Dr. Douglas Cunningham. In reporting on them he observes:—

It appears to be impossible to arrive at any definite conclusions in regard to the exact bearing of these returns on the theory of Professor Pettenkofer, for,—*1st*, there is an absence of data regarding the conditions prevailing in previous years, and consequently a want of grounds on which to found any comparisons; *2nd*, the amount of cholera has been almost everywhere very small throughout the year, returns of cases being furnished by only 23 stations, and by only 13 of these in a number exceeding 10; *3rd*, many of the returns are very imperfect, only including a certain number of months; *4th*, even, however, had all been perfect in number and form, it is still very doubtful how far many of them could have furnished information of any real scientific value, for in some cases there are very manifest evidences of carelessness in the conduct of the observations, as for example in one case in which the total depth in place of the water-level of a well was returned consistently during a period of months together; in other cases, although the observations seem to have been carefully and correctly taken, their source appears to have been incapable of affording indications of the conditions of soil moisture, or, at all events, of the changes in condition which are deemed of importance by the soil theory.

In certain cases, no doubt, it may be impossible to find a well or body of water which can be appropriated as a source of observation, and which will at the same time really indicate the assumedly important changes in soil conditions; and in such cases accurate data of rainfall, and general information regarding the amount of water in rivers, tanks, or other bodies of water present, will at all events furnish a certain amount of information.

While allowing that such an impossibility may exist in certain cases, it still appears to be very necessary that there should be a clear understanding, that observations on water-level are worse than useless unless they afford indications regarding soil moisture, and that the selection of sources from which observations are to be derived should be made accordingly. It is evident that wells like that at Bangalore, from which the returns of water-level for that station are derived, deeply excavated into the rocky basis of any locality, are, as a general rule, utterly incapable of affording definite information regarding those changes in soil conditions supposed by the soil theory to be influential in favoring or preventing the development of the introduced cholera germs, and there can be little doubt that others of extreme depth, such as those at Hissar, Sirsa, &c. (even if their water-levels do indicate the level of the first impermeable layer of soil), are equally ill-adapted for that purpose, seeing that it is very improbable that the water of a moderate local rainfall, or the organic impurities draining downwards from the surface, can ever reach that layer of soil, the conditions of which in regard to soil moisture are indicated by alterations in the level of the water in the wells.

There being so many fallacies and complications present, it might possibly be advisable, while carrying on all the observations which have been established, to select from the number of observing stations a set of standard ones, in which the conditions of soil moisture are, as far as can be ascertained, comparatively simple; and in these to have wells selected carefully, the extent of the areas over which the changes indicated in the well really serve as indices of changes in soil moisture being as far as possible distinctly ascertained, seeing that in certain localities it may be impossible, even within the limits of one large station, to find one well or other body of water which will indicate conditions of soil moisture for the whole place, as it is evident that, save where the soil is homogeneous and the impermeable basis so far level as to prevent the formation of separate drainage areas, the level in any one well can hardly afford accurate data regarding the conditions of soil moisture prevailing at any given time throughout the whole station.

A standard series of wells having been selected in this manner, observations on conditions of soil moisture, as indicated by variations in water-level, local rainfall, &c., taken along with the facts regarding the local development or absence of cholera within the area in which these conditions of soil moisture are accurately indicated, would certainly give definite results, whereas it is to be feared that the observations as at present conducted are in many cases mere sources of fallacy.

In all cases, in the more carefully selected cases as well as in the others, it would be very desirable, and would greatly facilitate the making up of general results, if all the returns were constructed on one definite plan, the absolute distance of the water-level from the surface being stated in every instance in feet, inches, and decimals of inches. It may appear unnecessary that returns showing changes of fractions of an inch in amount should be given, still it must be recollected that a change of level of very small amount may indicate a very considerable change in the conditions of the superimposed soil, especially when these changes are dependent on local rainfall.

I propose, in accordance with Dr. Douglas Cunningham's recommendation, that the observations should in future be confined to wells which have been specially selected as likely to afford reliable information on the extent of sub-soil moisture.

Dr. Douglas Cunningham's report on Pettenkofer's theory, as applied to certain stations in Madras, is given as Appendix B.

120. Some interesting information in elucidation of Pettenkofer's theory will be found in Dr. Douglas Cunningham's report given in the appendix, in the first portion of which he has described his enquiries into the condition of the subsoil water-level of certain stations which he visited in the Madras Presidency, and into the probable connection of this condition with their experience of cholera. Although these results do not warrant any decided conclusions, they enter on a field of enquiry—the relation of the soil to cholera—which has as yet received little attention in India; and by the clearness with which the facts are stated, and the unbiassed manner in which the evidence is weighed, they show how such important investigations ought generally to be conducted.

Dr. Lewis' report submitted last year has been most favorably received by the highest authorities. His work during the past year.

121. Dr. Lewis' account of the microscopic objects found in cholera evacuations, which was published last year, and which subsequently appeared as one of the appendices of the Annual Sanitary Report for 1869, has been most favorably received and generally accepted, both by the scientific journals and by the highest authorities, as a most valuable and important contribution to the literature of cholera. Since the date of that report he has repeated many of the experiments which were described in it, in connection with the various "germ" theories of cholera, and always with results precisely similar to those which have been already described. The conclusions which were then formed, therefore, remain as yet unmodified. Dr. Lewis has also been engaged with experiments on dogs, such as injecting into their veins varying quantities of choleraic dejecta in different degrees of dilution, but the results do not warrant any inferences whatever. The animals have certainly died, but this is all that can at present be said. The fact that there have been exceptionally few cases of cholera in Calcutta has enabled him to devote more time and attention to the microscopic appearances of the tissues, organs, and discharges of men and animals in health, and also to the pathological changes which are to be found in ordinary diseases—details, a practical knowledge of which is essential in making any special enquiry into cholera.

In addition to such investigations which are immediately connected with his particular work, Dr. Lewis has also been able to examine and report on various matters of sanitary interest requiring the use of the microscope. Among these may be mentioned the entozoa in ration beef, the supposed connection between disease and the use of old pit-stored grain in Berar, and the phenomenon of the discoloration of the lake at Nynee Tal, of which some account will be given in a subsequent section of this report. On all these subjects Dr. Lewis has been able to afford much valuable assistance, and there can be no question that, independently of the important enquiry into cholera, India presents a vast field for scientific and microscopic research of this nature, in the examination of which the most important results might be obtained.

Dr. Douglas Cunningham's report on microscopic phenomena connected with cholera, Appendix B.

122. Dr. Douglas Cunningham's labors were for some time interrupted by a very serious illness. When sufficiently recovered he made a tour in the Madras Presidency, and the information which he then collected is embodied, partly in the first section of his report to which reference has been already made, and partly in the second section, which contains the details of the microscopic examination of the objects found in cholera evacuations. Dr. Cunningham's painstaking investigations lead him to the same general conclusion as that which has been formed by Dr. Lewis, that the microscopic examination of cholera dejecta reveals no special fungus, and that, so far as can be judged by a series of the most careful examinations, there is no fungus peculiar to cholera such as Hallier has described. Appearances not unlike those which the Professor has figured have certainly been seen, but they are not characteristic of cholera. In many cases of cholera they are not present, while on the other hand they are frequently to be found in the evacuations of persons who were either in perfect health or suffering from other diseases. On this point Dr. Cunningham's evidence is very decided. He observes :—"The general results of all the observations and experiments on non-choleraic dejecta, which I have been able to carry out, have shewn not only that the same fungi are developed in such materials as in choleraic media, but that they more frequently contain distinct fungal elements as characteristic features of their original condition." But Dr. Cunningham, while agreeing so far with Dr. Lewis, is of opinion that cholera evacuations always present a large number of oval or cellular bodies which are not peculiar to the disease, but the presence of which in great abundance appears to him to be a constant feature of it. These bodies may be met with to a greater or less extent in all evacuations, and it is remarkable that they are immensely increased in number under the continued use of a violent purgative, such as sulphate of magnesia. On this point I shall quote Dr. Cunningham's own words :—"The general conclusions to be derived from the comparison of the characters of choleraic and non-choleraic dejecta appear to be, that as yet there is no evidence of the existence of any specific cells or other bodies peculiar to the former and never to be found in the latter, but that there is a distinct evidence that many of the peculiarities of choleraic dejecta are due to a great increase in the development of certain classes of cells common to them and to non-choleraic materials, and both intrinsic and extrinsic to the organism, and that, as regards the extrinsic cells, at all events this increased development may be ascribed in great measure to the presence of a favorable medium in the fluid which is effused from the blood." Whatever may be the true nature of these cells,—and on this point I do not offer any opinion,—they cannot with any propriety be designated "cholera corpuscles," for they are not characteristic of the disease, although, as I have just stated, their constant presence in great abundance is, in Dr. Cunningham's opinion, a peculiar feature of cholera dejecta. How far these are the same bodies which have already been described by Dr. Lewis, and which he does not consider of any special importance, remains to be seen. In order to arrive at some definite result, it is very advisable that Dr. Lewis' experiments should as far as possible be repeated by Dr. Cunningham, and that, on the other hand, the conclusions at which Dr. Cunningham has arrived should be further tested by Dr. Lewis. It will then appear how far the two observers agree, and what points require further enquiry and elucidation.

Dr. Cunningham's notes on the results of the microscopic examination of 70 specimens of water, and on the common kinds of fungi found in Calcutta, are of much interest. His report is illustrated by a series of very beautiful drawings, which do great credit both to the artist and the engraver.

Meetapore jail has been selected in order to test the effect of sanitary improvements in checking cholera within its endemic limits.

123. The special measures which were recommended by the Army Sanitary Commission, with the view of practically testing the power of sanitary improvements to check cholera within its endemic limits, were under the consideration of the Government when the last annual report was submitted. The jails at Meetapore, Rungpore, Midnapore and Hooghly in the Lower Provinces were at first selected as the most suitable places for conducting the experiment, being specially characteristic of Behar, Eastern Bengal, Orissa and Bengal Proper, and it was resolved that a careful topographical survey of the stations and country round should be made by a skilled engineer, so that a thorough system of drainage might be devised for them. Subsequently it was decided that the necessary steps should be first taken in one jail, and Meetapore was selected for the purpose. It is doubtful whether Meetapore is really within the endemic limits of cholera, but as the jail has been subject to frequent epidemics, it is not ill-suited for testing the benefits of sanitary improvements.

The returns of cholera among Indian emigrants in 1870 have not yet been received.

124. In connection with the special cholera enquiry in India, orders have been issued requesting that the statistics of disease among emigrants sailing from the various Indian ports should be annually collected. The returns for 1870 have been called for, but have not yet been received.

A new plan of map for illustrating cholera is now under consideration.

125. Among other measures to be devised for obtaining more complete information regarding the history and distribution of cholera throughout India, I may mention that a new plan of map for illustrating the annual prevalence of the disease in different parts of the country is now under consideration.

In 1868 Dr. Goodeve made certain suggestions for the preparation of such maps which were approved by the Right Hon'ble the Secretary of State, and their general adoption was prescribed by the Government of India. During the last two years maps, drawn to some extent in accordance with these instructions, have accordingly been appended to the annual reports of some of the Sanitary Commissioners, but the exact procedure adopted has varied much, and in no instance, that I am aware of, has it been found possible to give all the details which Dr. Goodeve proposed to show. There can be no question that a map which would tell at a glance the cholera history of each province during the year would be most useful; but it is equally evident that if each province adopts it own mode of action, both as to the amount of information to be given and the mode in which it is to be shown, the results will be most confusing. It is therefore of great importance that the best form of map which can be adopted should be well considered, and that it should be strictly adhered to. Dr. Goodeve's plan appears to be too complicated, and as a matter of fact every attempt which has been made to carry it into practice has been more or less unsatisfactory. The area of each province is so large, that in the case of a severe epidemic there is no room for the circular marks proposed, unless, indeed, the map were prepared on a very large scale, and then even the main facts could not be taken in at a glance. Dr. Goodeve suggested that these circles should mark only cantonments and large towns, and that a varied arrangement of dots should indicate villages, but the division into "slight outbreak" or "severe" outbreak, such as he proposed, is not sufficiently precise. It appears to me that in attempting to delineate the general history of cholera on a map so as to show the principal facts of the year, it is essential, for the sake of convenience, that it should not be of great size; that the figures marked on it should, as far as possible, give definite and precise information; and that the circle of mortuary registration, whether in town or country, should be the unit to which these figures should refer. The great points regarding which information is required are—the date of the first case in every circle, the date of last case, the period during which the intensity of the disease lasted, and the proportion of deaths which it occasioned. All these details could not be shown on any map of reasonable size, and I would therefore propose that the ratio of mortality from cholera in each circle should be noted on the map, and that all the other details should be given, either on the margin of the map or on a fly-sheet appended to it. To facilitate such an arrangement, the circle of mortuary registration should be indicated, not by its name, but by the number it bears in the annual form showing the deaths from cholera (No. VI). This form will shew the comparative prevalence of the disease in different months, but it would render reference much more easy, and supply some details which are not given in this table, if such a statement as I have suggested were attached immediately by the side of the map. With the means of reference so ready at hand, it would, I believe, be really more easy to learn the history of the epidemic in this way, than if a number of figures were crowded together in different parts of the country. To indicate the mortality from cholera, figures in red ink should be given in each circle of registration which suffered from the disease, shewing the actual ratio of deaths from this cause per 10,000 of the population, in the same manner as given by Dr. Farr in his map of the cholera of London in 1866. Taking the ratio per 10,000 instead of per 1,000 will avoid decimals, and so diminish the figures required. I have said that places should be indicated by numbers instead of names, but the names of important towns here and there throughout the province should be given, so as to recall an idea of the general geography of the country.

On these questions the opinions of the various Sanitary Commissioners have been asked for, and as soon as they have all replied, a definite proposal will be submitted to the Government.

Facts are now being widely collected, and they will be studied apart from all preconceived theories.

126. It will thus, I trust, be seen that every measure which can be adopted to obtain reliable information regarding cholera in India and to throw light upon the disease is now being taken. With the registration of deaths among the people, which although still far from accurate, yet already supplies general truths of no mean value, with monthly statements received from all parts of India shewing the current history of the disease, with the registers of cases made in all civil and military hospitals, with the special local enquiry which is about to be instituted in the Central Provinces, with the more scientific portion of the investigation patiently and carefully conducted by Drs. Lewis and Cunningham, it is to be hoped that in time much valuable information may be obtained. And even if all these efforts should in the end unhappily fail, and leave us as ignorant as ever of the laws which govern both the origin and distribution of the disease, it will be some ground of satisfaction that at all events an attempt had been made to study cholera in India on something like a scientific basis. And not only are facts now being widely collected—they will also be examined altogether apart from all preconceived theories. On this subject it will be sufficient to refer to the remarks contained in my review of the reports of the local Sanitary Commissioners for 1869, which is given in the appendix.

The statement of comparative sickness and mortality in the two wings of the 58th Regiment given in last report requires alteration.

127. Before leaving the subject of cholera, I must advert to the observations which are contained in my last annual report on the case of the 58th Regiment at Allahabad, and certain remarks which they have elicited. It will be remembered that immediately previous to 1869 this regiment had been divided into two wings, the right wing having been quartered at Darjeeling, a hill station, and the left wing at the plains station of Benares. During the epidemic of 1869 it was noted, as a very remarkable fact, that the first of these, the wing which had been in the hills, suffered much more than the other wing, not only from cholera, but from disease generally. A statement was given in last report shewing the details. It had been furnished by the regimental authorities, it had been signed by the Surgeon of the regiment and by the Commanding Officer, and it reached me after having been submitted to the Government in the usual manner. But the results seemed so strange and so contrary to what might have been anticipated, while at the same time the data afforded such a limited basis on which to build any general conclusions, that I carefully avoided offering any opinion with regard to them. It now appears that the statement was incorrect; it was compiled under great difficulties, the Commanding Officer being ill, the Clerks of the orderly-room dead, and there being no Adjutant with the corps. An amended statement has accordingly been prepared, and is here

introduced in order that it may have the same prominence as the return for which it is substituted.

HER MAJESTY'S 58TH REGIMENT.

Corrected Comparative Statement of Sickness and Mortality in the above Regiment since the meeting of the Head-quarters and Right Wing from Darjeeling, the Left Wing from Benares, and the Draft from England at Allahabad on the 12th January, up to and for 23rd August 1869.

SEALKOTE, 10TH MARCH 1871.

		DISEASES.																			
		CHOLERA.		INSOLATIO.		FEVERS.		DIARRHŒA.		DYSENTERY.		HEPATITIS.		RHEUMATISM.		VENEREAL.		OTHER DISEASES.		TOTAL.	
	Strength.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Right Wing and Head-quarters (from Hills) ...	390	62	46	6	4	131	3	84	2	25	1	8	...	12	...	86	...	143	3	557	59
Left Wing (from Plains)	243	28	16	2	1	56	...	42	3	13	...	19	2	13	...	38	...	96	2	307	24
Draft (from England)	96	14	11	2	2	48	2	26	..	4	...	3	...	2	...	24	...	41	...	164	15
TOTAL ...	729	104	73	10	7	235	5	152	5	42	1	30	2	27	...	148	...	280	5	1,028	98
		Percentage of above.																			
Right Wing and Head-quarters		15·89	11·79	1·53	1·02	33·58	0·76	21·53	0·51	6·41	0·25	2·05	...	3·07	...	22·05	..	36·66	0·76	142·82	15·12
Left Wing		11·52	6·58	0·82	0·41	23·04	...	17·28	1·23	5·34	...	7·81	0·82	5·34	...	15·63	...	39·50	0·82	126·33	9·87
Draft		14·58	11·58	2·08	2·08	50·00	2·08	27·08	...	4·16	...	3·12		2·08	...	25·00	..	42·70	...	170·83	15·62

To this return the following remarks are appended by Dr. Lundy, the Surgeon of the Regiment:—

The difference in the total mortality is the same as the difference between the mortality by cholera in the two wings; that is to say, placing cholera for the present out of the question, the mortality by all the other diseases has been about equal in the two wings, from 12th January to 23rd August 1869. Now, the cholera at the outbreak of the epidemic struck the occupants of No. 8 Barrack, Clydesdale Lines, with great force, and thus in great measure caused the cholera mortality of the right wing to be excessive for the first fortnight of the epidemic, as compared with that of the left. But there is no reason to suppose that if No. 8 Barrack had been occupied by a left wing company, instead of by one of the right wing, the former would not have suffered just as much as the latter did. Indeed all the subsequent experience, during the remaining four and a half months of the epidemic, points forcibly to this conclusion, that the greater prevalence of cholera in the right wing at first was a mere accidental occurrence which was no more attributable to the fact of the men having resided in the hills than the larger amount of venereal disease in the same wing is assignable to the same cause.

As regards the more important climatic diseases, it is right to make a few remarks. At the end of the year the number of admissions on account of fever from each wing became almost equal, while if the mortality in the right wing was greater than that of the left, the invaliding on account of fevers was greater still from the left than it was from the right. Bowel complaints appear to be pretty evenly balanced, whether the admissions and deaths up to 23rd August, or the admissions, deaths, and invaliding to the end of the year be taken. Hepatitis and rheumatism give results unfavorable to the left wing; and on the other hand insolatio prevailed to a greater extent in the right wing; but the total number of admissions (9) for this disease is much too small to admit of a reliable comparison. "Other diseases" show a slight preponderance in favor of the right wing.

An intelligent and unbiassed analysis of this table cannot fail to demonstrate that the wing from the hills maintained quite as good a health standard up to the 23rd August, or up to the end of the year (the latter date as affording larger numbers for comparison is preferable) as the so-called "seasoned" wing, which had not been out of the plains at all, did.

The main facts however remain as before, and are incapable of any satisfactory explanation.

128. But while it is right that this statement and these remarks should be placed on record, it must be observed that the observations which were made on the subject in last annual report require little or no modification. The figures shew a re-arrangement of the strengths, and as these strengths are given as they stood when the regiment arrived at Allahabad on the 12th January 1869, they do not form a very correct basis for calculation. But leaving this source of error out of account, it still appears that the right wing and the draft of recruits suffered more severely from cholera and from other diseases than the left wing. In the right wing the admissions were 1,428 and the deaths 151 per 1,000; in the draft the ratios were 1,708 and 156, while in the left wing they were 1,263 and 98, or leaving cholera out of consideration the results were as follows:—

	Ratio per 1,000.	
	Admissions.	Deaths.
Right wing	1,269	33·3
Left wing	1,148	32·9
Draft	1,563	40·4

The greater sickness and mortality among the right wing from the hills and the recruits from England, than in the left wing which had been for the three previous years in the plains, are still apparent. But while admitting these facts, I cannot admit that they warrant what appear to me to be the very hasty conclusions which have been drawn from them. The experience of a single regiment during a single year cannot afford evidence to shew that residence in a hill climate is calculated to render men more prone to sickness in their subsequent tour of service in the plains, nor will such an opinion ever be formed without very sufficient evidence by any one who has had experience of the hill stations in the Himalaya. With reference to the statistics of the different portions of the 58th Regiment and their several experiences at Allahabad in 1869, I can only repeat what I stated in last annual report—"It is difficult to account for these results, and no satisfactory explanation of them has been given. The facts are deserving of record for future reference and investigation, in connection with any similar data which may hereafter be obtained under like circumstances."

New hill stations occupied during the year. Raneekhet.

129. Raneekhet, on which working parties had been employed both in 1868 and 1869, has now been added to the list of hill stations. Situated about 20 miles to the north-west of Almorah, it occupies a hill the sides of which are much less steep than that of the surrounding ranges. The barracks are placed on excellent sites, at heights varying from about 6,000 to 6,200 feet above the level of the sea. The water in the immediate vicinity is somewhat scanty, but with the aid of reservoirs to hold the surplus quantity of the rains the supply will be abundant. The climate throughout the year is excellent, and the view of the snowy range is extremely grand. The cantonment has been arranged with great attention to all sanitary considerations; broad and nearly level roads have been laid out to the extent of several miles, and the mistakes which have been committed in nearly all the other hill sanitaria have been carefully avoided. There is every reason to expect that very excellent results will attend the occupation of Raneekhet. Immediately adjoining the military cantonment is another hill rising to 7,000 feet, on which it is proposed to have a civil station.

Puchmurree.

130. The following particulars regarding the new hill station of Puchmurree in the Central Provinces are taken from a special report on the locality by the Sanitary Commissioner, Dr. Townsend:—

The Puchmurree hills, situate in latitude north 22° 27′, longitude east 78° 27′, and with a height above sea-level of 3,500 feet, are a part of the range which forms the northern face of the Satpúrás, and which, running nearly due east and west, overlooks the Narbadá valley along its whole length. Ranges of equal elevation run in a parallel direction to the south of Puchmurree, the mountainous tract of country included under the name of "the Satpúrás" being here from 80 to 100 miles in breadth from north-to south. The distance from Bankheri, the nearest Railway station in the Narbadá valley, to the village of Singhanama at the foot of the hills, is about 20 miles; and as the soil of the intervening tract of the country is hard and rocky, the approach from the plains is made without difficulty. The elevation of the site of the station above the base of the hill is rather more than 2,000 feet; the ascent is made in 13 miles by a road which without much difficulty could be made practicable for carts. The area of the plateau is about eight square miles, the contour is irregular, but it may be said to be about four miles in length from north-east to south-west by one in breadth. To the west the peaks of Doopghar, Chourádeo, and Máhádeo rise abruptly to the height of 1,000 feet above the plateau, while to the south and south-east it is bounded by the precipitous scarps that overhang the valley of the Denwa. The surface is undulating, with a general incline from west to east. Many of the slopes have been to a great extent cleared of forests and are covered with grass, but the plateau generally is well wooded. Peepal, mhowa, sál, hurra, and jamun are the most frequent trees; many of them are of large size and massed under the rocks that bound the plateau, or disposed in clumps of varying size over the grassy slopes; they give a park-like aspect to the landscape. The geological formation consists of Máhádeo sandstone, a coarse porous grit with hard iron-earth partings. The soil where the rock is covered is a reddish-brown loam containing a large admixture of sand; it is nowhere of any great depth, and in many parts beds of gravel lie between it and the rock. In respect of dryness and cleanliness the soil and substrata are all that could be wished for sites of dwellings, and when roads and walks have been made, it will be possible to take out-door exercise after the heaviest rain. The drainage of the plateau is effected by the channel of a stream which commences towards the west, and winding through the whole length of the plateau in a very tortuous course, at length finds its way through clefts in the rock to the edge of the eastern scarp, over which it falls by an abrupt plunge of several hundred feet into the valley of the Denwa. The slope of the ground from all sides towards this stream is considerable, and as its channel is in many places cut deeply in the rock, and is everywhere much below the general level of the plateau, the natural drainage is good. Around the source of the stream and elsewhere spaces of limited extent remain swampy after the rains, but the defective drainage of these spots can be easily remedied. No measurements of the depth of the subsoil water from the surface of the ground at different seasons of the year have been made; for the greater part of the year it is probably not much above the level of the stream, but the level to which it rises during the rains, and the rapidity with which it falls after they have ceased, can only be ascertained by actual observation. The stream is supplied from springs at its source, and is augmented to a considerable extent by subsoil drainage as it winds through the plateau. The supply is perennial; it becomes small as the hot weather advances, but there will probably be no difficulty in obtaining a good supply of water at all seasons of the year from wells sunk at a little distance from the stream. The water is soft and clean and pleasant to the taste.

The mean temperatures compare very favorably with all the other stations. It is said that in the hottest weather the temperature is not uncomfortable for more than two or three hours in the day, and that at night in the open air or in a verandah a blanket is always necessary to comfort. In the hot weather the atmosphere becomes very dry, as is the case everywhere else in these provinces; but in the rains mists at times hang over the hill for days together, and the atmosphere is then rather chilly. It is during the rains and the months of September and October that the difference of the temperature at Puchmurree and at lower elevations is most marked. The rainfall, however, is not above the average of the stations in the plains, and is much below that of Jabalpúr and other places. During the winter months the climate is very pleasant; frosts are not infrequent, but the temperature of the air seldom falls very low. The Puchmurree plateau formerly had the reputation of being malarious. The valleys of Sonbadrá and Denwa, which encircle the hill and which are clothed with dense forest, are undoubtedly unhealthy from the setting in of the rains till December or January, but the rise of the hill from these valleys is very abrupt; in fact, on the south and east the sides are precipitous scarps, 1,800 or 2,000 feet in height; it is therefore not probable that any malaria rises from them to this height, and it may be presumed that whatever malaria there may be on the plateau is developed there. When I visited it two years ago, I made enquiries on the subject from the inhabitants of the village, and I ascertained that although ague does not prevail to any great extent, it does occur in the autumn months. The people, however, consider the ague to be produced by the use of the water of the Bangangá (the stream that winds through the plateau), and they say that if well water is used it will not occur. In 1865 and in former epidemics, when cholera broke out in the annual fair held under the Máhádeo caves, the inhabitants of the village on the plateau suffered; but since 1865 the fair has been suppressed, and pilgrimages are made singly or in small parties only, and the late epidemic of 1869, which created great havoc in the Narbadá valley, did not reach the plateau. Experience of the climate by others than the native inhabitants has been limited, but so far as it goes it is in its favor. Mr. Davidson, an Overseer of the Forest Department, lived there for 20 consecutive months—from March 1868 to November 1869—and continued in good health throughout the time, although he had suffered much from ague before he went there. Captain Hallett also, who has resided in charge of the place since April, is now in better health than when he went there. A gang of from 70 to 100 prisoners has been employed on the hill since April, and the return of sickness and mortality among them is on the whole favorable. They did not remain free from intermittent fever, but it was generally of a mild type; one death from remittent fever occurred, but the attack is said to have been brought on by unusual exposure. The greatest number of cases of ague were admitted in May and in November. Admissions from bowel complaints were remarkably few, and the cold damp of the rain did not give rise to any prevalence of chest affections. It may be said, then, that the local conditions are such as are commonly supposed to be favorable to health. The climate at all seasons of the year is moderate, the rainfall is not excessive, the soil is not retentive of moisture, the substratum is porous, and the subsoil water is probably not retained near the surface for any long period after the rains have ceased. A sufficient supply of water may be obtained from wells, and with proper precautions it may be preserved pure and wholesome. There is ample space for out-door amusements, and occupation might be found in gardening and agriculture. The scenery is more attractive than that of many other hill stations, and there are many places of interest in the neighbourhood. I think probability is in favor of the place proving healthy and suitable for a permanent station for European troops, or as a place of resort during the hot weather and rains.

Steps have been taken to preserve the purity of the water-supply, and attention has also been given to other sanitary requisites.

Unfortunately, the huts were not ready when the very early rains of this season commenced, and after a fall which lasted for several days, it was deemed advisable to send down a great proportion of the men, and to leave only those for whom a better shelter than tents had been provided. In the early part of June the Brigadier General reported most favorably of Puchmurree, and remarked that the men who had been sent up had derived decided benefit from the change. Later accounts are also excellent.

In the hill stations a cottage style of barrack has been found best adapted to the climate.

131. The barracks on the new standard plan, the building of which had been commenced, have been continued, and many of them have been completed during the year. Regarding barracks in the plains no fresh orders have been issued, except in so far as concerns minor matters to which reference will be made immediately. In the hills, however, it has been found that a cottage style of building is much better suited to the climate than the large and very airy structures, which, however well they may be adapted for the plains, must be extremely cold during the winter in the hills. As readers in England have little idea of the climate during the cold months in the hills of this part of India, I shall here extract some information regarding Dalhousie, which has been supplied by the Executive Engineer. Dalhousie, it is to be remarked at the same time, presents an extreme case, being far to the north, and also having an elevation greater than that of the other sanitaria.

General climate and temperature at Dalhousie.

The winter of 1869-70 was one of unusual severity. From the 1st November to the 4th December 1869 the weather was very fine, bright sunshine with a cold bracing breeze; the temperature averaging from 40° to 52° Fahrenheit in the shade, and according to the time of day. From the 4th to the 18th of December there were incessant showers of sleet and rain with bitterly cold driving winds, which ended on the latter date in a heavy fall (about 2½') of snow, the temperature at 3 P. M. on that day being 29° Fahrenheit, or 3° below freezing point. From the 18th December to the 18th January 1870 the weather was variable and most unpleasant, alternating between snow and rain, the slush freezing hard in the middle of the day as soon as the rain stopped—the thermometer during that month varying from 5° above to 5° below freezing point. On the 19th January over 5' of snow fell in one night at Baloon, and 2' of snow in the Bukloh cantonments; and from that date until the 3rd of March the snow continued falling at intervals, and lay without thawing deep on the ground. Not having a maximum and minimum thermometer, I cannot exactly give the greatest degree of cold; but on the night of the 20th January, I have noted the thermometer in the verandah to be at 8° Fahrenheit below freezing point, whence I suppose 10° to be about the most extreme cold to be expected at Dalhousie. From the beginning of March to April, the weather growing milder, heavy falls of rain completely cleared off the snow about the 20th of March.

Only road to Dalhousie blocked up by snow.

In the winter of 1867-68 the total fall of snow, although more gradual, was fully as great as in 1869-70—the heaviest fall in one day being 3 feet on the 8th of March 1868. In both these years the road into Dalhousie was practically impassable from snow, for mules or even laden coolies, from the 18th December to the 10th of March. The only communication with the plains being along native paths dropping down the hill sides, the deep snow drifts in the shady spots, and re-entering corners of the road effectually bars further progress. The new military road, now under construction, will not be sufficiently advanced during the current official year to admit of mule or of coolie traffic.

But even at ordinary hill stations the cold in winter is sometimes great, and large lofty buildings are not calculated to prove comfortable quarters. At Raneekhet an excellent style of cottage barrack has been adopted, consisting of a centre day-room 20 x 40, and four dormitories, two on either side. Each of these dormitories is 35 x 22, with a height of 12 feet from the floor to the wall-plate. The floor is raised 2 feet above the ground. The building is intended to accommodate 40 men and 2 sergeants, for whom separate end-rooms are provided, attached to the verandah which surrounds the whole. These barracks have also been adopted at Chuckrata and Murree.

Modification in plan of quarters for married soldiers on the hills.

132. Similar changes have also been found advisable for hospitals, but no general instructions have been issued, either in regard to them or to barracks in the hills. The standard plan of married quarters for hill stations has however been modified. The same extent of space is not needed here as in the plains. The measurements have accordingly been somewhat reduced, and at the same time the principle that the accommodation to be provided should as far as possible be adapted to the number composing each family has been adopted. The height of the rooms will in future be 12 feet in place of 16, as formerly ordered, and the following scale will be observed in the provision of quarters for married soldiers at stations in the hills:—

For a private soldier and his wife	1 room	14'×14'
For a man and his wife with one or two children... ...	1 „ 1 „	14'×14' 14'×14'
For a man and his wife with more than two children ...	1 „ 1 „	16'×14' 14'×12'

each quarter having a bath-room attached to it.

The proportion of the several descriptions of quarters to be regulated as follows:—

For a man and his wife without children	30 per cent.
For a man and his wife with one or two children	60 „
For a man and his wife with more than two children	90 „

Sun-shades have been provided to screen verandah openings in the new barracks.

133. In the new barracks the glare and heat of the sun shining through the wide arches of the verandahs have been found so great a discomfort, that orders were issued early in the current year to provide sun-screens, for both upper and lower stories. Wooden louvres, which might be moveable either in whole or part, are considered most suitable, but where such arrangements cannot be followed without risk of damage to the building fixed louvres are to be provided. To complete the protection from the sun, coarse curtains (purdahs) are recommended, which should extend from the bottom of the louvre to the top of the verandah railing. These curtains can be rolled up at night, and removed altogether during the rainy and cold seasons. In the Oudh barracks, as venetians could not be supplied before the hot weather set in, only purdahs have been provided.

Minor alterations in other matters connected with accommodation for troops.

134. On matters of minor importance connected with barracks, it may be mentioned that it has been decided to build no more separate plunge-baths for women. The bath-rooms attached to each set of family quarters, provided that a proper supply of water is secured for them, are considered ample. As a matter of fact, the plunge-baths for women and children, which were experimentally tried at a few stations, have been but little resorted to. An order has been issued directing that punkahs shall be provided in all regimental and voluntary workshops. A reduction has been made in the extent of accommodation for regimental quarter-guards. Chicks—curtains made of thin slips of bamboo—to keep out the flies, have been sanctioned for the doors of all hospital cook-houses. The custom of issuing straw for bedding for

soldiers on the march, at the rate of 6lbs per man per diem, which has been in force in the Madras Presidency, has been extended to Bengal.

The returns of thermometrical observations in barracks, although not much to be relied on, are not unfavorable to the new buildings.

135. In order to test the comparative temperatures of the old and new barracks, thermometrical observations in various parts of each set of buildings have been kept at the stations of Barrackpore, Allahabad, Lucknow, Saugor, Mhow, Nusseerabad, Morar, Jullundur, and Peshawur. These records, however, have not proved very satisfactory; discrepancies appear in the registers which are altogether unaccountable, and it is to be feared that the rooms in which the thermometers were placed have not always been subject to the same conditions as to occupation, open doors, or the use of tatties. Without attention to these matters, no comparison could properly be made of the amount of protection afforded by different buildings. The returns, for these reasons, hardly afford ground for any correct conclusions, but they do not support the opinion that the new barracks are subject to those marked extremes of temperature to which they were supposed to be specially liable. On the contrary, these buildings, as a whole, present rather favorable results, the mean temperature being somewhat lower than in the others, and the range between the maximum and minimum smaller.

The returns designed to show the protection from disease afforded by upper stories are too scanty to afford ground for generalization.

136. The returns designed to show what influence upper stories have in protecting their inmates from cholera, fever, or the other varieties of climatic disease have not been generally kept, and the data which they contain form too limited a basis on which to found any accurate generalization. The subject has of late received special attention, and a new and more complete form has been devised from which full information ought in time to be obtained.

Special attention has been drawn to the importance of the cleanly watering and feeding of cattle and the thorough cooking of the meat as the best preservatives against tape-worm.

137. The rejections of ration beef on account of cystic disease in 1870 were very few, and were chiefly confined to Rawul Pindee. In connection with the appearance of these cysts, some interesting facts have been recorded by Dr. Oliver, of the Royal Artillery, at Jullundur. It appears that at one time cysts were very frequently met with at this station, and that large quantities of beef were in consequence destroyed. Dr. Oliver was led to believe that the cattle were infected after their purchase by the Commissariat, and that the medium through which this took place was a large dirty tank where they were taken to water. The tank, besides being generally filthy, was close to the huts of the camel drivers—men who are notoriously dirty in their habits, and who are not unfrequently affected with tænia mediocanellata. Human filth was often to be seen on the banks of the tank, and the microscopic examination of mud and stagnant water taken from the margin exhibited tænia ova. The connection between the cysts and this tank was further supported by the fact that the cysticerci found in the cattle were of very small size. Whether Dr. Oliver's opinion is correct or not, it is certainly remarkable that the "cysticercus entirely disappeared from amongst the cattle a few months after means had been taken to secure them a good supply of well water." The following facts are of interest:—"During 1868 and 1869," writes Dr. Oliver, "I from time to time obtained pieces of beef badly infected with cysticercus, and made some experiments as to the results of its consumption under different conditions.

"*1st.*—After explaining to them the possible consequences of eating it, a buttock of beef studded with cysticercus was given to three natives of low caste. They all declared that they were free from tænia. The meat they cooked in their own way. These men were under my observation for some six months. Two of them had no symptom of tænia, but the third, who was a low class Mahomedan syce, and had probably eaten the meat in a very raw state, developed a tænia mediocanellata in about three months.

"*2nd.*—My own sweeper ate this cyst-infected beef regularly two or three times a week for some months. He cooked it well, generally as an ordinary stew, and has never shown a sign of having tape-worm.

"*3rd.*—In the case of a Hindoo boy of low caste, two scolices of cysticercus within three or four months produced a tænia mediocanellata."

From these and other cases, which were made the subject of careful investigation, Dr. Oliver concludes that "the safety or otherwise of eating cyst-infected beef simply depends on the manner in which it is cooked. If this meat is thoroughly done, and presents no rawness when cut into, the measles appear like little nodules of coagulated albumen, are doubtless perfectly inert, and may be eaten with impunity." Special orders have been issued enjoining on all Commissariat Officers the great importance of the very careful watering and feeding of the cattle intended for slaughter, and attention has also been again drawn to perfect cleanliness in the cook-rooms and thorough cooking of the meat as the best preservatives against tape-worm.

Results of water analyses shown in seventh report.

138. A seventh report on the results of water analyses has been submitted, showing the character of the supply at the out-post stations of Peshawur and fifteen other cantonments in different parts of the Presidency. Dr. Palmer, in his introductory observation, remarks on the very different influences which constantly act on tank-water, some causing deterioration, and others again correcting these evils; and he shows how the results of analysis vary according to the relative power which the one or the other may at the time be exerting. The general results obtained at the different stations may thus be summarized:—

Alipore.—The water of the tank on the west side of the parade ground showed increasing impurities from January to May. The well sunk at the side, and which merely contained tank-water well filtered, had fallen into disuse, although the supply was of superior quality.

Fort William.—The supplies are exceedingly foul, but owing to excellent filtration are of fair quality when actually used.

General Hospital, Calcutta.—The water of the tank in February was quite unfit for use. The municipal water is much required.

Dum-Dum.—Tank-water analyzed in May, although inferior, contrasted favorably with most other tank-water—a result attributed to the abundant growth of water-plants.

Umritsur City.—The water obtained from wells showed extreme pollution. One well yielded in every gallon 47·6 grains of chlorides and 11½ grains of volatile organic matter, or 164 parts per million. The results obtained with Norton's tubes showed that the water-bearing stratum was saturated with sewage.

Nowgong.—Water of jails good quality, but the wells are reported to have latrines in dangerous proximity.

Jhansie.—The deepening of the wells into the granite rock has been attended with most beneficial effect as regards both quantity and quality.

Morar.—The wells at the southern end of the station are said to contrast favorably with those at the northern end.

Deyrah Doon.—Canal water impregnated with mineral matter, but otherwise unusually free from impurity.

Chuckrata.—Water very hard, but remarkably free from indications of sewage contamination.

Roorkee.—Excellent water in wells, but the canal water purer still.

Bhawulpore.—Water much impregnated with sulphate of soda, which also is found in the soil.

Mooltan.—Wells show a very large proportion of mineral matter.

Landour and Mussooree.—Water of great purity.

Nagode.—Trench latrines reported to be too near the wells.

Further analyses in military cantonments stopped.

139. It has been decided that, for the present, no further steps need be taken for the examination of the waters of military cantonments in this Presidency. The question of the manner in which the enquiry may best be conducted among the civil population is under consideration.

Pumps and filters have been ordered for wells.

140. To the very important subject of water-supply for the troops, much attention has been paid. It has now been determined that in the lines of every European regiment, as a commencement, at least one well, the best that is available, should be selected, covered over, and provided with a pump, a filter-bed being also attached. From this the water is to be carried in metal pails, but these have as yet been sanctioned only as an experiment at certain stations. It was suggested that the present rough filters, composed of three earthen vessels placed one above another, might be rendered more efficient by increasing the quantity of

sand in them, but the apparatus is altogether so defective that this slight modification could have little effect. A better description of filter is much required, and the trial of Dr. Macnamara's pattern has so far been very satisfactory. Arrangements have been made to obtain from England the supply of animal charcoal which is necessary for them.

Special scheme for supplying water at Nusseerabad and Gwalior.

141. The question of the water-supply at several important stations has also been specially discussed. The want of a good supply at Nusseerabad has long been felt, and a project for collecting the rainfall from the roofs of the barracks, and for storing what will be sufficient for drinking and cooking, has been sanctioned. For these purposes a daily allowance of 4 gallons per head is considered sufficient, and this amount will be easily obtained even with the minimum fall of 10 inches over the gathering ground proposed. The catchment of the water, the position of the impounding tanks and storage reservoirs which are to be covered, have also been considered. A similar scheme for the supply of the garrison in the Gwalior fortress is also under discussion.

Special scheme for Peshawur.

142. In order to remedy the evils arising from the use of the impure water which runs in an open channel through the cantonment of Peshawur, a project has been sanctioned for bringing water from the Bara river, and distributing it in pipes through both the city and the station. It is proposed that 20 gallons per head should be supplied; that the water should first be allowed to deposit the silt with which it is heavily charged, especially in the rainy season, in a settling tank; that it should then be filtered and supplied through standards placed in convenient situations. The Special Committee, by whom the details of the scheme were finally settled, were of opinion that in order to secure the full benefit of the new water, and accurately to test its effects on the health of the people, the filthy stream should be diverted from its present course, as natives generally much prefer to drink of the running water. Against this proposal it has been urged that, without such means of irrigation, the cantonment would speedily become a desert. On this point no orders have yet been received. The improvement of the water-supply of Meean Meer has also been the subject of special discussion in connection with the remarks which were made by the Army Sanitary Commission on the sixth report of water analysis in this Presidency.

Normandy's condenser not required for Indian stations.

143. A question has arisen as to whether Normandy's condenser might not prove to be well adapted to Indian stations, but although the merits of this apparatus have long been acknowledged on board-ship, and although it would, no doubt, prove of great value in places where pure water can be obtained in no other way, it does not seem to be required in this country. As a rule, good water is to be had in abundance, and the evils which have hitherto existed have generally not arisen from any natural defects, but from the neglect of the most ordinary precautions. In some few places the water is naturally bad, but where this is the case, or where other sources of supply are scanty, the rainfall can be collected and stored in the manner proposed for Nusseerabad and Gwalior. Such an arrangement appears to be better suited to the circumstances than the employment of an apparatus which would entail constant outlay for fuel, and which, if ever out of order, would, in the absence of skilled labor, with difficulty be set to rights.

Conservancy. Dry-earth system. Mr. Hickey's carbonizer.

144. As regards matters of conservancy, it may be noted that although the dry-earth system for latrines has not yet been authoritatively introduced, it has continued to be followed with marked success, and it appears that it may be generally sanctioned without any increase of expense, for the small extra establishment which may be required will be compensated for by a corresponding reduction in the number of water-carriers whose services were necessary under the old system. Mr. Hickey's mode of disposing of the sewage from latrines and urinaries by carbonization has been experimentally tried at Dum-Dum, and the Committee who reported on the results have

recorded their opinion that it is specially adapted to the station, as "it is found impossible to follow the trench system in the rains without the most unsatisfactory results." With reference to this remark, however, it is to be observed that in the jails of the Lower Provinces the trench system has been found to work well throughout the year. Sanction has been accorded to a further trial of Mr. Hickey's apparatus, provided a contract can be made for the disposal of the resulting products as manure at fair rates.

Urinals. Waste water from wash-houses. Disinfectants.

145. The new pattern urinals have, on the whole, been found to answer well, but failure has occurred in some places, owing to the inferiority of manufacture, and especially of the glaze. It appears that the use of dry-earth for cleansing them, owing to its containing grits, may to some extent have acted injuriously, and it has therefore been suggested that water may be employed for the purpose. It has been decided that the waste water from wash-houses should be led off in small masonry ducts, and then in earthen channels to be utilized in grass plots and gardens. In future, carbolic acid and McDougall's powder will be issued in equal proportions, the acid being more economical and easy of transport, while in most cases it is as efficacious as the powder. A general code of instructions for the use of disinfectants is in preparation.

Sanitary progress reports.

146. Attention has lately been directed to the importance of having regular annual reports on the nature and extent of all works executed for the removal of causes of disease, whether among troops or among the civil population throughout India. In my general review of the annual reports of the local Sanitary Commissioners for 1868, I recommended that in all their future reports a special chapter should be devoted to a statement of any sanitary progress which may have been effected during the year; and I proposed from these materials to prepare a general summary as a special section of my annual report, shewing what improvements had been attempted under the different local Governments and Administrations, and how far they had been carried into effect. The Army Sanitary Commission, in their memorandum of the 4th January 1871, direct special attention to this proposal, and strongly recommend its adoption. They suggest that such "reports should show the nature and extent of engineering sanitary works and other public health measures proposed and carried out year by year in stations, cities, villages, and country districts throughout India. These reports should also discuss generally the state of health of the population, with special reference to the amount of zymotic diseases, and the mortality from them, in localities where sanitary improvements are projected, and also where such improvements have been carried out." This extract clearly indicates the nature of the reports desired, while the importance of keeping me informed of the character and extent of all works and measures for improving the public health of troops and civil population, both for purposes of comparison and also for enabling me to shew in my annual reports what improvements have been carried out, and their effect on the disease and mortality statistics of the year, is insisted on in a succeeding paragraph. For the proper sanitary state of the cantonments and the health of the troops in them, the cantonment committees and the officers in medical charge of the different corps are primarily responsible. The local Sanitary Commissioners, on the other hand, are concerned solely with the condition and improvement of the civil population. The importance of obtaining accurate information, as regards the sanitary condition of all military stations, has long been recognized. In his despatch No. 70, dated the 9th March 1865, the Secretary of State directed that, with a view to the preparation of a complete statement of the health of the army in each year, of the various measures which have been either determined on or carried out with a view to the improvement of that condition, and of the results of these measures, arrangements should be made for obtaining annual sanitary reports from every military station in the country. This order for some time remained in abeyance, but in the beginning of 1867 my predecessor, in his letter No. 56, dated the 6th February, suggested that it should be acted on without further delay, and that the sanitary officer of each cantonment

should, as soon as possible after the close of each year, prepare a report of the preceding twelve months; and in order to save unnecessary labor and prevent the repetition of much information which is obtainable from other sources, a series of questions was proposed to which clear and concise replies should be given. Under the orders of the Government contained in Military Department No. 398, dated the 12th March 1867, this proposal was generally approved, but a few alterations were made in the questions, and it was ruled that although the sanitary officer of the cantonment committee was the proper person to be communicated with, his report should be approved and signed by the other members of the committee before being forwarded to the Sanitary Commissioner with the Government of India. In accordance with these instructions, reports were called for from each cantonment for the year 1866, but the information received was so meagre and unsatisfactory that no attempt of the kind has since been made. Since 1866 the defect has to a certain extent been remedied by the monthly sanitary reports of the administrative officers of the British Medical Department, which are regularly submitted to the Government, and copies of which are forwarded to this office for information and record. But these reports do not deal in sufficient detail with the sanitary defects of Indian stations or the remedies required; and it is to be observed, moreover, that they are also necessarily imperfect, in that they relate to European troops only. The special measures which have been suggested for obtaining information regarding the progress of sanitary improvement, both in military cantonments and the country generally, are now under the consideration of the Government.

Replies to questions on Indian sanitary matters by the Army Sanitary Commission.

147. In my last annual report I stated that, during a recent visit to England, I had the advantage of meeting the Army Sanitary Commission, and of discussing with them many important points connected with the health of the Army in India. In answer to questions which I suggested for consideration at their request, they prepared a series of replies which discuss the subjects of subsoil drainage, the cultivation of land within cantonments, the disposal of sewage, the improvement of native towns, water-supply, barracks at hill stations, the best time for troops to arrive in this country and for invalids to leave it, as well as other matters of much interest and importance. I proposed to append a copy of these papers, but as they have already appeared in the last sanitary summary which issued from the India Office, and also in the Report of the Army Medical Department for 1869, which has lately reached this country, I believe that they must now be generally known.

SECTION II.

NATIVE TROOPS.

The main facts regarding Native troops and Prisoners will be briefly alluded to.

148. The many important questions which have already been discussed have occupied so much space that I shall very briefly advert to the main facts connected with the sanitary history of the Native troops and Prisoners during the past year. The general statistics of Cholera, Small-pox, and Fevers, as they appeared in both of these bodies, have already been given, in order that they may be compared with the extent of sickness and mortality which have been due to these causes among European troops, and also with a view to illustrate more fully the prominent sanitary characteristics of the year by showing the geographical distribution of the chief diseases. No further allusion need, therefore, be made to them as they affected either the Native Army or the Prisoners, except where the history of some particular regiment or of some particular jail may call for special remarks.

Total death-rate, Regular Native Army.

149. Out of a total strength of 44,731 men composing the Regular Native Army, 869 died during the year, or a proportion of 19·43 per 1,000. This ratio is somewhat above the average of the previous nine years, 1861—69, but slightly lower than in 1869, 1863, and 1861, in which it was respectively 20·41, 19·73, and 20·31. These figures in each case embrace all deaths that had been recorded among men on leave as well as among those who were present with their regiments, but reports regarding absentees are always more or less imperfect, and the higher ratios may in some degree be due to greater accuracy in the returns.

Punjab Irregular Force.

In the Punjab Irregular Force, out of an average strength of 12,200, there were 230 deaths, or an equivalent of 18·85 per 1,000, a ratio considerably under that of the year previous, when it amounted to 26·72, but much above the average of the five preceding years.

Central India Irregular Force.

The Central India Irregular Force, the strength of which averaged 4,918, lost 52 men by death, or a proportion of 10·57 per 1,000, a result which contrasts favorably with the mortality of 18·09 per 1,000 in 1869, and which, chiefly in consequence of the unusual loss of that year, is under the average of the previous four years for which statistics have been recorded.

Death-rate among men with their regiments—Regular Native Army.

150. Taking only the men who were present with their regiments, the body on which the sickness and deaths recorded in the tables have necessarily been calculated, the mortality was 15·89 per 1,000, representing a loss of 632 out of an average strength of 39,783. This rate is under that of 1869, when it equalled 17·29, and of 1861, when it amounted to 16·79 per 1,000, but is higher than that of any of the other nine years with which comparison can be made.

Punjab Irregular Force.

In the Punjab Irregular Force the death-rate, 15·78, was nearly the same as in the Regular Army, a ratio which contrasts favorably with 25·36 in 1869, but is higher than that of any one of the other four years, 1865—68.

Central India Irregular Force.

The regiments which have been grouped together as the Central India Irregular Troops, out of an average strength of 4,054, lost 10·85 per 1,000, a ratio one-third less than that of either the Regular Native Army or of the Punjab Frontier Force, and which compares favorably with the average of the preceding five years.

The diseases to which the mortality was chiefly due.

151. The diseases to which the mortality was due may now be arranged in the order of their importance, and for convenient reference the results in the Regular and Irregular Forces may be placed side by side.

Diseases.	Regular Native Army.	Punjab Irregular Force.	Central India Irregular Troops.
	Died per 1,000 of Average Strength.		
Fevers	4·65	4·52	4·93
Respiratory Diseases	3·22	5·00	1·23
Dysentery	1·94	1·06	·74
Diarrhœa	1·06	·19	·25
Phthisis Pulmonalis	·88	·48	......
Cholera	·75	......	......
Atrophy and Anæmia	·48	·48	·25
Spleen disease	·25	·38	......
Apoplexy	·23	·96	......
Heart disease	·20	·10	·25
Wounds and Accidents	·20	·10	·98
Dropsy	·17	......	......
Scurvy	·17	·10	......
Small-pox	·13	·10	·25
Hepatitis	·13	·10	·25
All other causes	·98	1·15	·98
Died out of Hospital	·15	1·06	·74
Total ...	15·89	15·78	10·85

The most remarkable feature in this statement is the fact that in all the three bodies of men more than one-half the loss by death has been due to the first three diseases which head the list, Fevers, Respiratory diseases, and Bowel complaints.

High death-rate in the Regular Native Army quartered in the Punjab.

152. If the statistics of mortality in the different groups of the Regular Native Army be examined, it will be seen that the death-rate has fallen on them very unequally. In the first it was 15·59, in the second only 10·98, in the third 11·65, in the fourth 13·74, and in the fifth it attained a maximum of 19·48. This comparatively high mortality in the Punjab was due to two diseases, Fevers and Respiratory affections, from which 201 men died, or about two-thirds of the total loss of 305, the ratio having been 7·09 from the one, and 5·75 per 1,000 from the other. The extreme prevalence of fever in the Upper Punjab has been already alluded to, and it has been shewn how greatly the European troops suffered from it. There is no reason to conclude that the disease as it affected the Native soldiers was of other than the ordinary malarious type. Affections of the lungs have been unusually fatal, and to them reference will be made hereafter.

Death-rate at individual stations. 1st group.

153. The distribution of the death-rate at the different stations occupied by the Regular Native Army is clearly shewn in Table XIII. In the 1st group the mortality fluctuated between 2·69 at Cachar and Sylhet and 29·36 at Buxa, but of the

latter sudden deaths out of hospital contributed 3·45. Independently of cholera, which proved fatal at eight of them, the death-rate in the stations of this group has been generally high. At the same time it is to be remarked that the average ratio of 15·59 per 1,000 for Native troops in Lower Bengal and Assam compares very favorably with the returns of the previous nine years, in none of which it was under 20. In two of them it exceeded 30 per 1,000.

2nd group.

In the stations of the 2nd group the losses by death were much lower than in those of the 1st group. Cawnpore shows a mortality of only 3·50 per 1,000, and the maximum which was attained at Lucknow was 19·10. Other years in these provinces have, however, given much better results.

3rd group.

In many of the stations of the 3rd group the death-rate was low. In six, out of the ten which are included in it, the ratio was under 10 per 1,000; in one of these it was less than 5, but in the other four stations, Deyrah, Roorkee, Meerut, and Delhi, it was high, varying from 16·57 to 19·40.

4th group.

The 4th group, which represents Agra and Central India, exhibits considerable differences; at Deolee the death-rate was only 9·85, at Agra it was 16·07. The high ratio shown for Lullutpore is the equivalent of only two deaths occurring among a small body of men. The death-rate for the group as a whole is above the average.

5th group.

In the Punjab, as has been already stated, the general results were very unfavorable, and the statistics of individual cantonments show that many of them suffered from a very high death-rate in 1870. Omitting a few which were occupied by a small garrison, five of them had a mortality above 20 per 1,000. The loss of 53·25 at Meean Meer is remarkable. At this station 73 sepoys died, 60 of these deaths having been due to fever and respiratory diseases. The death-rate for the province as a whole, 19·48 per 1,000, although no part of it was due to cholera, is higher than in any of the previous nine years, excepting 1869.

Mortality in individual regiments.

154. Individual regiments suffered severely. In the 13th at Barrackpore the death-rate equalled 28·25 per 1,000; in the 8th at Alipore, 33·00, and in the 41st at Buxa, 42·17. In the 2nd group the losses were generally smaller. In the 4th Regiment at Allahabad they equalled 32·58, and in the 9th Regiment at Lucknow 52·19 per 1,000, but these high death-rates in both cases were due chiefly to the unhealthy influences of Eastern and Lower Bengal in which they were quartered for a portion of the year. The 3rd group contains only one regiment in which any exceptional mortality occurred. This was the 3rd Native Infantry at Meerut, in which the death-rate was 41·85, but this loss is properly to be ascribed to Peshawur, as explained in a foot-note to the regimental table. The corps left Peshawur in a sickly state; eleven deaths occurred on the march, and eight more soon after reaching Meerut. In the 4th group the death-rate in two instances, the 33rd Native Infantry at Morar and the 39th at Jhansie, exceeded 20 per 1,000. Of the regiments in the Punjab, seven had a death-rate under 10 per 1,000. In the 20th Native Infantry at Tullagunge it equalled only 1·43, but many of the others lost heavily. In the 21st at Meean Meer the loss by death equalled 45·59; in the 25th at Peshawur 51·44, and in the 35th at Meean Meer no less than 88·06 per 1,000. In the Punjab Irregular Force the highest ratio, 38·04, occurred in the 4th Sikhs at Bunnoo. In none of the six corps composing the Central India Irregular Troops was there any excessive mortality.

Sickness of the year.

155. The admissions into hospital in the Regular Native Army amounted to 1,492 per 1,000, a ratio very much the same as that for 1869, when it equalled 1,501, but considerably in excess of the average of the preceding eight years. The sickness was unequally distributed, for while the cases of illness were 1,460 in the first group, they were 1,251 in the second, 1,009 in the third, 2,216 in the fourth, and 1,605 in the fifth. In the Punjab Irregular Force the admission rate equalled 2,101, and in Central India only 1,143. The extent of sickness in the Punjab

during 1870 and 1869 is shown by the fact that the average daily proportion of men in hospital in the Irregular Regiments of the province during those years was 60 per 1,000, or nearly double what it had been in any one of the previous four years.

Diseases in the order of their prevalence.

156. The proportion in which different diseases contributed to this admission rate may be seen in the annexed statement, in which the statistics of the Regular Army are compared with those of the Irregular Troops.

DISEASES.	Regular Native Army.	Punjab Irregular Force.	Central India Irregular Troops.
	Admitted per 1,000 of Strength.		
Fevers ...	837·9	1330·6	638·3
Wounds and Accidents	110·7	131·6	92·5
Abscess and Ulcer	101·7	144·1	77·2
Dysentery ...	87·4	93·5	43·9
Rheumatism ...	55·0	63·4	42·7
Diarrhœa ...	50·8	75·0	20·7
Respiratory diseases	48·6	66·9	30·8
Venereal diseases	34·8	19·9	43·9
Eye diseases ...	25·9	29·9	46·9
Spleen disease .	24·3	11·0	4·2
Scurvy ...	2·7	3·3	·3
Phthisis Pulmonalis	2·4	1·3	·5
Hepatitis ...	1·8	2·2	1·5
Small-pox ..	1·5	1·0	·5
Cholera .	1·3	·0	·0
Apoplexy ..	·5	2·0	·3
Dropsy .	·5	·4	·5
All other causes	104·5	125·8	98·9
TOTAL.	1492·3	2101·0	1143·6

Distribution of disease in the Upper Punjab.

157. The relative amount of sickness in the different provinces has already been alluded to, as well as its excessive prevalence in the upper portion of the Punjab. This fact is more clearly indicated in a special Table, No. X, in which the statistics of all the Native troops serving beyond the Indus, whether Regular or Irregular, are included. The results here shown are very unfavorable. With 2,165 admissions per 1,000, the daily sick averaged 59·5, and the deaths equalled 18·96. The proportion of cases of fever alone was nearly 1,400 per 1,000.

Comparative sickness at different stations.

158. Table XI shows very clearly how the troops at different stations suffered, the proportion who were daily inefficient from sickness throughout the year, and the variations in this proportion which occurred from month to month. In No. XII particulars are given of the ratio of admissions into hospital, and the causes to which these were chiefly due.

1st group.

Tried by the first of these standards, the results in a few of the stations of the 1st group were unfavorable. The constant sick rates at Fort William, Alipore, Barrackpore, and Berhampore, 61, 53, 51, and 57 per 1,000, were high. At the two first of these the admissions exceeded a ratio of 2,000, and this high rate also obtained among the few Native troops at Tezpore. The diseases chiefly prevailing were Fevers and Dysentery.

2nd group.

The results in the 2nd group of stations were much more favorable. The general sick rate for this province averaged only 38. The maximum ratio in any one cantonment was 49, and at three of them, Dinapore, Segowlie, and Fyzabad, it was under 30 per 1,000. Cawnpore shows the highest admission rate, 1,896. In five out of the eleven stations representing this province, the proportion was under 1,000. Fevers prevailed to some extent both at Cawnpore and Allahabad; at Nagode the number of cases of Dysentery was large, but with these exceptions, the returns do not indicate excess of any special diseases.

3rd group.

In the 3rd group the statistics are even more satisfactory. The general sick rate equalled only 34 for the year, and excepting Delhi, where it was 54, the returns from all the stations are favorable. Of the ten stations which it embraces, five show a daily proportion of sick under 30 per 1,000. At Shahjehanpore, it was only 16. The admissions followed a similar distribution. Excepting Delhi, where fevers were very prevalent, in no case did they exceed 2,000. In eight out of the ten stations the ratio was under 1,000.

4th group.

The 4th group, in which fevers were generally prevalent, shows very different results. Here the sick rate was 61, or nearly double what it was in the 3rd group. In none of the stations was the sick rate under 30. In three of them, Morar, Nowgong, and Deolee, it exceeded 80, and in the last-named cantonment it nearly equalled 100 per 1,000. The admission rates were also high. Only at Jhansie was the proportion under 1,000. In the other stations it varied from 1,267 to 3,525 per 1,000. Fever was the prevailing sickness, but both at Morar and Nowgong, Dysentery, Diarrhœa, and Rheumatism caused an unequal degree of inefficiency.

5th group.

The 5th group, as a whole, does not show any excessive sickness, and in none of the stations which are included in it did the daily ratio of men in hospital equal that which generally obtained in the 4th group, but in many of the stations of the Punjab the sepoys suffered much, especially from fevers. Taking the 16 cantonments in which the strength of the garrison exceeded 200 men, it appears that in only six of them was the sick rate under 30 per 1,000. In the other ten it varied from 39 to 65. In five the admissions were under 1,000; in the others the ratio varied from 1,153 at Jhelum to 2,399 at Peshawur. Fevers and bowel complaints were the prevailing diseases.

Punjab Irregular Force.

But among the men of the Punjab Frontier Force these affections were even more prevalent, for here the sick rate averaged 60 per 1,000. In six of the seven stations it exceeded 50; at both Murdan and Rajanpore it was about 100. The admission rate in all cases exceeded 1,500; in four of them it was over 2,000, and at one of these it attained a maximum of 3,241.

Central India Irregular Troops.

The sickness among the Irregular Troops quartered in Central India was comparatively slight. Excepting Deolee, where nearly 60 per 1,000 were daily in hospital, the ratio in no case exceeded 40. At four of the seven stations occupied, the admissions were under 1,000, and generally much below this proportion. At Deolee a maximum of 1,702 was attained.

Sickness in individual regiments.

159. The statistics of individual regiments are fully detailed in Table XVI. Taking 2,000 admissions per 1,000 of strength as a standard, any excess over which indicates very great sickness, it appears that in the 1st group three regiments suffered very much—the 22nd Native Infantry at Fort William, the 8th at Alipore, and the Body Guard at Ballygunge. In only one corps quartered in the second province, the 10th Native Infantry at Cawnpore, did the cases of illness

exceed a ratio of 2,000 per 1,000, and the same remark applies to the 17th Native Infantry at Delhi in the 3rd group. In the 4th group four regiments suffered extremely, especially the 6th Native Infantry at Morar, in which the admission rate equalled 4,813, the highest ratio of sickness in any Regiment of the Regular Native Army. Of regiments in the Punjab, seven, of which five were at Peshawur and two at Nowshera, had also a very high admission rate. The same remark applies to thirteen out of twenty-two corps composing the Punjab Frontier Force. The Irregular Regiments in Central India were all comparatively healthy.

Respiratory diseases.

160. Allusion has already been made to the unusual sickness and mortality among Native troops which was due in the past year to Respiratory diseases. The admissions and deaths under this head were both much in excess of the ratios for any one of the previous nine years. Of the total mortality of 15·89 per 1,000, 3·22 was due to this cause. Of the 128 deaths ascribed to it in the Regular Native Army, 90 occurred in the Punjab, and of these again 51 took place at the two stations of Meean Meer and Peshawur. The heaviest loss fell on the 35th Regiment; in this regiment 59 men died during the year, and of these deaths 48 were due to Fevers and diseases of the respiratory organs. What is the true nature of the chest affection, which proved so destructive, I have no means of judging, for I have had no opportunity of seeing any reports regarding the regiment, and as the Officer who was in medical charge was himself attacked with the disease and obliged to go home on sick leave, the history of the epidemic is in all probability incomplete. As will be seen in the next section, similar cases appeared in the Jails, and also, I am given to understand, among the general population of the Punjab. By some the disease has been regarded as Pleuro-pneumonia of a contagious nature, while others consider it to be merely a complication which is apt to occur in the course of malarious fever, especially in Natives who have been debilitated by repeated attacks of the disease during a sickly autumn, and whose lungs are very prone to be implicated in the early months of the cold season.

SECTION III.

JAILS.

The vital statistics of Prisoners have been favorable.

161. The average number of persons daily imprisoned in the jails of the Bengal Presidency during the year 1870 was 59,878, a number somewhat below that of 1869, but much above that of any one of the previous eleven years. Among this body the admissions into hospital equalled 982, the daily sick 30, and the mortality 41·92 per 1,000. As regards sickness, the results compare favorably with former years. In 1868 the admissions were equivalent to 941 per 1,000, but in all the other years from 1859 the ratio was higher; in 1860 it amounted to 1,491. The daily sick-rate in 1870 was also comparatively low. In 1868 it was only 29, but in the other ten years to which complete statistics extend it varied from 31 in 1869 to 57 in 1860. The death-rate for 1870 is much under the average of the preceding eleven years, in some of which it exceeded 60, 80, and even 100 per 1,000, but it is not so favorable as it was in either 1867 or 1868, in which it was only 38·32 and 30·28. Some jails, as we shall see, suffered to an unusual extent, but the general results for the Prisoners of the Presidency as a whole have been decidedly favorable, especially when the extreme prevalence of Fever over a considerable portion of the country is taken into account.

Diseases which chiefly prevailed in the order of their prevalence.

162. The diseases which chiefly prevailed were, as usual, Fevers and Bowel complaints. Arranged in the order of their prevalence they stand as follows:—

	Admitted per 1,000 of strength.
Fevers	468·3
Dysentery	99·8
Diarrhœa	86·6
Abscess and Ulcer	83·2
Respiratory diseases	38·5
Wounds and Accidents	33·4
Rheumatism	22·1
Venereal diseases	17·3
Eye diseases	12·3
Atrophy and Anæmia	11·0
Cholera	9·1
Spleen disease	8·2
Phthisis Pulmonalis	4·8
Scurvy	2·3
Dropsy	1·8
Small-pox	1·3
Hepatitis	1·1
Apoplexy	·6
All other causes	80·7
TOTAL ...	982·4

Their unequal distribution in different groups.

163. But while these ratios represent the results among the Prisoners of the Presidency as a whole, a glance at Table VIII, in which the statistics of the six different groups of jails are compared, will show that the distribution of disease was very unequal among them. Cholera, for example, which

contributed 20 and 13 cases per 1,000 in the first two groups, added but one admission in the fourth, and was entirely absent in the other three. Small-pox also, nowhere prevalent, was almost altogether confined to the first two groups. Fevers, which caused ratios of 345, 352, and 381 cases per 1,000 in the second, fourth, and fifth groups, are represented by 510 in the first, 667 in the third, and 660 in the sixth. The prevalence of Fevers over different areas, it may be remarked, is not shown by any means so prominently in the statistics of prisoners as among the troops or the general population, a result which appears to be due to the fact that they are not exposed to the night air, and probably also to the protection which is conferred by the high walls within which they are confined. Dysentery and Diarrhœa, Rheumatism and Respiratory diseases all show similar variations in the extent to which they affected the prisoners in different groups. The admission-rate of the different provinces varied from a minimum of 812 in the second to a maximum of 1,178 in the first.

Comparative sickness in individual jails.—1st group.

164. Individual jails present very striking differences. Omitting the very small prisons which hardly afford sufficient data for comparison, the admissions into hospital in the first group varied from the small proportion of 341 at Bhaugulpore to 1,993 at Hooghly. In none of those containing an average of 200 prisoners and more, did the rate amount to 2,000. In only two did it exceed 1,500.

2nd group.

In the 2nd group the results were very varied. In many of the prisons the inmates preserved a remarkable immunity from disease. At Ghazeepore the admission-rate was only 149, and at Baraich 268; at Hurdui, and also in the Lucknow Central Jail, it equalled only about 300 per 1,000. In thirteen jails it exceeded 1,000, and at Futtehpore, owing to the prevalence of intermittent fever, which alone contributed one-half of the total ratio, the cases of illness were equivalent to 2,482 per 1,000.

3rd group.

The 3rd group is composed chiefly of very small jails. In only three of them, Raepore, Hoshungabad, and Nagpore, did the average strength amount to 200, and in all of these there was considerable sickness, the ratio of admissions varying from 1,199 to 1,802 per 1,000. In several of the small jails both Fever and Bowel complaints were very prevalent, and the total admission-rate for the whole group, 1,397 per 1,000, is high.

4th group.

Omitting the four small jails in the 4th group the amount of sickness presents very remarkable extremes; at Jhansie the admissions into hospital were only 393; at Ajmere they were 1,440, and at Jubbulpore 1,742. In both of these last the excess was in a great measure due to Dysentery and Diarrhœa, which caused a ratio of 231 cases in the one, and 434 in the other. There was also a marked difference in the fever-rate; for while at Jhansie the cases of this nature equalled only 106, at Ajmere they were 581, and at Jubbulpore 511 per 1,000.

5th group.

In the 5th group the jail which enjoyed the highest standard of health was Budaon, and here the admission-rate was but 231. The Etah, Shahjehanpore, and Moradabad prisons were all very healthy, and in none of them did the ratio amount to 500 per 1,000. At Etawah and Seharunpore the results were much less favorable, for in the first of them it was 1,024, and in the second 1,972. In both cases fevers contributed much more than one-half of the total.

6th group.

In the Punjab similar fluctuations appear. In six out of the twenty-nine jails of this province, the admission-rate was under 500 per 1,000. At Goojrat it was at a minimum of 308. In ten of them it was above 500 and under 1,000. In thirteen the ratio exceeded 1,000, and in some of these it was very high. In all the frontier jails sickness was very prevalent, chiefly Fevers. The excessive sickness in the Lahore Female Jail represented by 2,935 cases of illness in the 1,000, deserves special notice, and reference will be made to it in a subsequent paragraph.

Diseases in the order in which they occasioned the mortality.

165. The total mortality of 41·92 per 1,000 was due to the following diseases, placed in the order in which they severally contributed to it :—

	Died per 1,000 of Average Strength.
Dysentery and Diarrhœa	16·67
Fevers	5·91
Respiratory diseases	4·79
Cholera	3·52
Atrophy and Anœmia	3·17
Phthisis pulmonalis	1·77
Dropsy	·75
Wounds and Accidents	·60
Spleen disease	·39
Hepatitis	·30
Apoplexy	·28
Scurvy	·24
Heart disease	·17
Small-pox	·14
All other causes	3·22
TOTAL ...	41·92

Mortality from them in different groups.

166. The comparative mortality which these occasioned in the different groups may be studied in Table VIII, to which allusion has already been made as containing the details of sickness. Except in the first two groups, neither Cholera nor Small-pox can be said to have had any influence on the death-rate. In the first three, Fevers caused a loss of from 3 to 3·68 per 1,000, but in the other two the death-rate under this head was very high, amounting to 10·27 in the one and 11·73 in the other. Bowel complaints were also very fatal, especially in Meerut and Rohilcund, in which a mortality of 29·34 per 1,000 was due to these affections alone. In the other groups it varied from 8·14 in the sixth to 19·54 in the second. In the Upper Provinces also Respiratory diseases were very fatal, especially in the Punjab, where the deaths under this head equalled 9·85 per 1,000. In the jails of Meerut and Rohilcund Atrophy and Anœmia caused a death-rate of 6·31, and in this province the highest mortality of any one group in 1870, 56·04 per 1,000, occurred, a result which is all the more striking when compared with the favorable returns of the preceding five years.

Mortality in individual jails.—1st group.

167. The death-rate in the jails of Bengal Proper and Assam was 46·52, the equivalent of 658 deaths among a body of 14,143 prisoners. The ratios varied greatly in individual jails. Omitting those in which the average strength did not amount to 200, the minimum mortality, 10·20, occurred at Sylhet, the maximum, 122·81, at Rungpore. The death-rate at Cuttack, 116·73, was also very high. In this last jail the unfavorable result was due almost entirely to Cholera, which caused 26 out of the 30 deaths of the year; at Rungpore there was not a single case of cholera, but 25 deaths occurred from Dysentery and Diarrhœa. In six other jails of this group the mortality exceeded 50 per 1,000.

2nd group.

The second province gives a total death-rate of 39·83; but the details of individual jails vary greatly. At Kheree the loss was only 4·29. In the Seetapore and Futtehghur District Jails it was about 8. In all the others it exceeded 10 per 1,000, and in many was extremely high. In ten of them it was over 50. At Ranchee it was 70; in the Allahabad Central Prison, 77·46; at Futtehpore, 78·26; at Banda, 81·87; at Jounpore it was no less than 150·60. In this last named jail the result was mainly due to an outbreak of cholera, to which further reference will be made. At Ranchee also more than half the mortality was owing to this cause; but in the other jails Cholera was altogether absent, and Dysentery and Diarrhœa were the great causes of death.

3rd group.

In the 3rd group, although not a single case of cholera occurred, the death-rate was 37·27. In several of the small prisons the mortality was very high, but the numbers are too small to be taken separately. At Sehore, for example, the ratio of loss was 120 per 1,000, but this represents only three deaths occurring among a small population. In two of the three larger jails the mortality was not excessive. At Nagpore, chiefly owing to Bowel complaints and Scurvy, it equalled 55·06.

4th group.

The 4th group, as a whole, gives the comparatively low death-rate of 33·73 per 1,000, and, excepting Jubbulpore, in none of the larger jails was the mortality excessive. Here, owing chiefly to Dysentery and Diarrhœa, the ratio was 62·79. At Lullutpore and also at Saugor the deaths among a small number of prisoners were numerous. The Agra Central Prison, with a ratio of 17·80, shows a more favorable return than in any previous year.

5th group.

The death-rate in the 5th group of jails, 56·04 per 1,000, was extremely high, especially for this portion of the country, in which of late years the results have been generally satisfactory. In the Bareilly and Meerut Central Prisons, at Seharunpore and Mozuffernugger, and in the Meerut District Jail the mortality was excessive, varying from 57·46 in the first to 110·69 in the last of them. Malarious fever was very prevalent and fatal among the free population of a great part of this area, and the exceptional loss is generally attributed by the jail medical officers to the debilitated condition in which many of those who died were on their imprisonment.

6th group.

The death-rate of prisoners in the Punjab generally was not very high, equalling 35·98, but many of the jails show very unsatisfactory results. In six of them the ratio exceeded 50 per 1,000. At Delhi, at Lahore in the female jail, at Mooltan, and also at Rawul Pindee and Peshawur the loss was excessive; Fevers, Bowel complaints, and Respiratory diseases chiefly caused these results.

CHOLERA.
History of the several outbreaks generally wanting.

168. A reference to Table XI shows that while, with the exception of a single case which occurred at Jubbulpore, the prisoners in the four last groups were entirely free from Cholera, the inmates of the jails in the two first suffered considerably from the disease. In Bengal Proper and Assam both the admissions and deaths from this cause were slightly higher than they were in either 1867 or 1868; but, excepting those years, the history of 1870 as regards Cholera compares very favorably with that of the preceding eleven-year period. In the 2nd group Cholera was somewhat more prevalent and fatal than it had been in either 1862 or 1868; but an admission-rate of 13 and a death-rate of 4·50 from this disease are comparatively small for this province. The history of the different outbreaks is unfortunately wanting. In the annual jail reports reference is generally made to a special report on Cholera, which has been submitted to the medical authorities, but copy of which has not reached me. Registers of Cholera cases have not yet been received from the jails in this presidency.

Outbreak at Jounpore in February.

Some particulars have been given in the first section of this report regarding the outbreak of Cholera in the Hazareebaugh Central Prison in connection with the disease, as it affected the European troops at that station. The epidemic in the Jounpore jail was the most severe which occurred throughout the Presidency, and a copy of the medical officer's report regarding it has been printed in the Selections from the Records of the Government, North-Western Provinces. The disease appeared unusually early in the year. The first case occurred on the 3rd February, a second on the 6th, and a third on the 8th; but it was not until the 9th that it became prevalent. On that day 10 prisoners were attacked, and during the next five days 65 other cases were admitted. From the 3rd to the 23rd, on which day the last case occurred, 100 prisoners were attacked, of whom 30 died. Dr. E. A. Fitzgerald, from whose report these particulars have been taken, is of opinion that the disease was not the result of contagion, and that it could be ascribed neither to Cholera tainted water nor to unwholesome food. The facts, to his mind, point to the presence of a cholera miasm, which was wafted by the winds and rendered active under the influence of moisture.

Respiratory diseases unusually prevalent and fatal in the Punjab.

169. Omitting other diseases the statistics of which are apparent in the tables, the prevalence of Respiratory affections and the unusual mortality which they occasioned during the past year deserve special notice. The admission rate from this class of diseases, 38 per 1,000, is higher than that of any year since 1860, and the same remark applies to the death-rate, which equalled 4·79. But the unusual prevalence and fatality under this head were really due to a few jails in the Punjab. In this province the admissions from this cause were 58 per 1,000, as compared with 35 in 1860, the maximum of any year since 1859. The death-rate was 9·85, as compared with a maximum of 4·61 in 1861. Of the 126 deaths ascribed to Respiratory affections throughout the province, 84 occurred in five jails, the Central Prison at Lahore, and the jails of Mooltan, Dera Ismail Khan, Rawul Pindee, and Peshawur. To the reports from them we must look for some information regarding the disease.

170. The particulars regarding the epidemic as it appeared in the Lahore Central Prison are thus given by Dr. Lethbridge:—

Pleuro-pneumonia in the Lahore Central Prison.

In January and February an epidemic of pleuro-pneumonia prevailed in the jail. During these months the ratio of admissions per cent. of average strength was 14·00, the daily sick 6·40 per cent., and the mortality rate ·90 per cent. of average strength per mensem. A large number of pleuro-pneumonia cases were first admitted, and consequently afterwards returned under the heads of intermittent fever, disease of the respiratory system, diarrhœa and dysentery. A glance at the mortality rate of these diseases while the epidemic lasted is quite sufficient to show that another and more fatal disease was at work, the principal symptoms of which were fever, pneumonia, and diarrhœa.

* * * * * * * *

I have not had an opportunity of observing many cases of pleuro-pneumonia, but judging from those that I have seen, I should say that it was a continued fever, having a general resemblance to typhus and typhoid fevers, not so infectious perhaps as the latter, but running a more rapid course than either of them. This is probably due to the extreme prostration produced by the pneumonia; a first attack does not appear to afford protection against a subsequent one. A sweeper employed in attending the sick was twice attacked with pleuro-pneumonia last year; the second attack proved fatal. The premonitory fever is at first relieved by slight remissions; in the course of two or three days pneumonia sets in, and the case now runs a most rapid course. Convalescence is sudden, especially when the lungs are not much affected. A case is seldom prolonged in its acute stages beyond the 12th day. Recovery is sometimes retarded by diarrhœa. Although no eruption has yet been discovered, yet there is decided desquamation of the cuticle in many cases during convalescence. Delirium is not a common symptom, but it often accompanies cases which die within two or three days after being attacked. A *post-mortem* examination almost invariably shows inflammation of one or both lungs; these are sometimes infiltrated with pus. Thick layers of lymph attach the surface of the lung to the walls of the chest. This white lymph on the surface of the lung is very characteristic in some cases. I have also noticed inflammation of Peyer's patches, and small ulcers about the ascending colon in cases that have had diarrhœa as a prominent symptom. Death often takes place during recovery by the sudden plugging of some large vessel by cardiac emboli composed of whitish-yellow lymph.

* * * *

The epidemic in the Central Jail suddenly stopped about the end of February. As a last resource all the patients from the hospital were taken to the Gola Serai just before the epidemic stopped. This change could hardly be said to have been the cure. No doubt the patients were benefited by it, but the conditions under which the disease was developed were precisely the same, except that the warm weather was rapidly setting in; the mean minimum temperature in the air had risen from 34·93 in January to 53·53 in March.

The disease in the Mooltan Jail.

171. In the Mooltan jail the disease was more severe. The
are thus given by the Civil Surgeon, Dr.

The first case of pneumonia was admitted into the jail hospital in the month of October 1869. In November three cases of pleurisy and one of pneumonia were admitted. In December six cases of bronchitis. In January 1870 the disease became epidemic; eighteen cases of bronchitis and eight of pneumonia were admitted. In February and March the diseases of the respiratory organs attained their maximum; sixty-eight cases were admitted in February, and forty-seven cases in March. On the 11th March a temporary hospital having been erected outside the jail, the whole of the prisoners with chest diseases were removed into it, and the jail hospital vacated; the disease then rapidly declined. The jail unfortunately was excessively crowded; there were more than one hundred prisoners above the regulated number. The hospital accommodation was insufficient for so large a number of sick, and consequently I was unable to isolate the cases of chest disease from the other prisoners. A temporary hospital was erected outside the jail and occupied on the 11th March, and on the same day one hundred and fifty prisoners were transferred to the Montgomery jail. I at once reduced the number of prisoners sleeping in each barrack from 72 to 60, placing the short term prisoners outside in the work-sheds. The general effect of these arrangements was speedily manifested. Thirty cases of pneumonia were admitted into hospital between the 1st and 11th March, the day on which the sick were removed outside the jail and the transfer of 150 prisoners took place. From the 12th March to the end of the month only thirteen more cases were admitted. The disease was stopped and rapidly declined. I am unable to state the cause of the disease. There was nothing obviously wrong about the sanitary condition of the jail, excepting the crowded state. These diseases were very prevalent amongst the Mooltan police, and 59 cases were admitted into the police hospital from October 1869 to 30th April 1870. From what I can learn, I believe the disease was prevailing in the Mooltan district. The native doctor of Shujabad informed me that bronchitis was very common in that town. The Sub-Assistant Surgeon does not think that the disease was prevalent in the town of Mooltan, as few cases came to the dispensary; patients, however, with acute disease of the lungs, are scarcely in a fit state to attend as out-patients at a hospital. I see that Dr. DeRenzy gives it as his opinion that pleuro-pneumonia is a contagious disease; after this epidemic I am strongly inclined to the same opinion. If not contagious like small-pox or scarlet fever, I feel certain that in some way it is communicable from the sick to the healthy. Many were rapidly attacked without previous illness. There was nothing very noteworthy about the symptoms; there was of course difficulty of breathing, rapid pulse and hot skin. As a rule, there was no delirium; this was only present shortly before death, nor was diarrhœa usually present. I mention this as nearly all the cases which have lately come under my notice in the police hospital and in the jail have almost invariably been accompanied with great looseness of the bowels.

A few cases at Dera Ismail Khan.

172. Regarding the few cases which occurred at Dera Ismail Khan, Dr. Courtney writes:—

Deaths have been 14 in number; more than in any previous year since 1856. Of these three were due to fevers, and six to chest diseases, four of the latter from pneumonia taking place within a few days of one another during the month of December. The disease was at the time prevalent among the people of the district, as it has frequently been of late years. It was of a low asthenic type, and came on very insidiously, one case in an old man ending fatally in less than 24 hours. *Post-mortem* examination in three cases showed intense congestion and commencing suppuration of both lungs, and in one case also pleurisy on the right side. The weather at the time of this quasi-epidemic of pneumonia was by no means at its coldest, and no complaints of cold were made by those prisoners whom it attacked. It was, moreover, ascertained that bedding and clothing were in no way deficient. I am much inclined to believe that the disease, both among the free population and in jails, is often due to respiration of foul air, especially at night, in crowded and often imperfectly ventilated rooms or barracks.

At Rawul Pindee and Peshawur, where deaths from Respiratory diseases were more frequent than usual, there is no history of any epidemic of pleuro-pneumonia, but mention is made of the uncommon prevalence of fever of an asthenic type in which serious lung complications were apt to arise.

Excessive mortality in the Lahore Female Jail.

173. Not a single case of pleuro-pneumonia occurred in the Lahore Female Jail, but the mortality among the prisoners, 112·90 per 1,000, was very high. Of the 21 deaths which occurred here, 14 were due to Dysentery and Diarrhœa. The medical officer is of opinion that the low state of health of the women is due to the influence of malaria acting on persons whose food is not sufficiently nourishing to enable them to resist its effects. Whatever may be the cause, there can be little doubt that some radical defect exists in this jail. During the last seven years the death-rate has varied from 40·00 to 124·14, and the annual average for the period has been nearly 80 per 1,000. The excessive mortality of young children who are brought into jail with their mothers is also deserving of serious consideration. In 1870 Dr. Lethbridge states that 62·16

per cent. of them died; "a woman," he observes, "seldom retains her milk after she has been a month in jail."

Summary of results among European Troops, Native troops, and Prisoners in each Province.

174. In concluding a brief notice of the main facts connected with the sanitary history of the jails in 1870, a statement is appended to show the comparative admission and death-rates among European troops, Native troops, and Prisoners in each of the groups into which the Presidency has been divided:—

GROUPS.	EUROPEAN TROOPS.		NATIVE TROOPS.		PRISONERS.	
	Per 1,000.					
	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
First group	1179·4	16·54	1460·0	15·59	1178·4	46·52
Second "	1354·1	22·97	1251·3	10·98	812·8	39·83
Third "	1284·1	18·65	1009·1	11·65	955·0	33·73
Fourth "	2122·6	22·23	2216·6	13·74	779·9	56·04
Fifth "	2323·0	24·18	1605·6	19·48	1072·1	35·98
Sixth "	...	...	...	...	1397·4	37·27
Total for the Presidency ...	1731·9	21·90	1492·3	15·89	982·4	41·92

It is to be observed that the 6th group refers to jails only. It includes the prison population in the Central Provinces, excluding Jubbulpore and Saugor, and is represented on the map by the area marked "4 a."

SECTION IV.

GENERAL POPULATION.

Orders of the Government of India on the general review of the sanitary reports for 1869.

175. The main facts connected with the sanitary history of 1869 are stated in the general review of the annual reports of the local Sanitary Commissioners, which I submitted to the Government some months ago, and copy of which will be found in the Appendix. The suggestions which were then made regarding the preparation of these reports, and which are detailed in paragraph 87 of this review, have been approved, and instructions have been issued with a view to their general adoption. Special attention has also been directed to the delay which has hitherto attended the appearance of the provincial reports, and to the great importance of their early submission. I hope that in the next Annual Sanitary Report I may be able to embrace all the facts of the year, not only as regards the army and jails, but also the general population of the country.

Annual reports for 1870 not yet received, but results of mortuary registration are given.

Only one of the reports of the local Sanitary Commissioners for 1870* has yet reached me; but I have been able to obtain the results of the mortuary registration in the different provinces, and these have already been given under the heads of Cholera, Small-pox, and Fevers in the first section of this report. I shall now append the statistics of deaths which have been registered as due to "Bowel complaints," "Injuries," and to "Other causes" which have not been individually specified, but I shall leave all remarks on these results until I have had an opportunity of reading the reports of the local Sanitary Commissioners.

Deaths from Bowel complaints.

176. The annexed statement shows the number of deaths registered from Bowel complaints:—

Statement showing the deaths from BOWEL COMPLAINTS *registered in the different Provinces in each month of* 1870.

PROVINCES.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total of 1870.	Total of 1869.
Bengal Proper...	No statistics.						1,547	1,892	1,877	1,527	1,372	1,612	9,857	Not known.
North-Western Provinces ...	Included with "all other causes."													31,452
Punjab ...	1,831	1,154	1,223	1,496	1,981	1,600	1,761	2,559	3,910	3,914	3,303	2,517	27,249	30,953
Oude ...	406	351	366	418	277	304	1,013	1,290	1,746	1,664	1,309	1,242	10,386	6,235
Central Provinces	1,176	1,024	981	983	1,052	918	1,091	1,639	1,783	1,434	1,235	11,881	14,407	12,550
Berar ...	379	405	291	420	596	487	1,128	2,621	3,199	2,116	1,465	1,205	14,312	6,154
British Burmah	Not given by months.												884†	630

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* From the North-Western Provinces. † In 17 towns only.

Deaths recorded from "Injuries."

177. The deaths ascribed to Injuries are shown in the following statement:—

Statement showing the total deaths from INJURIES *registered in each Province in* 1870.

PROVINCES.	INJURIES.					TOTAL OF 1869
	Suicide.	Wounding.	Accident.	Snakebite or killed by wild beasts.	TOTAL OF 1870	
Bengal Proper	616*	346*	2,553*	3,568*	7,083*	Not known,
North-Western Provinces ..		Included with "All other causes."				Do.
Punjab	243	265	3,130	944	4,582	4,832
Oude	984	728	5,128	962	7,802	3,200
Central Provinces	474	124	1,371	851	2,820	1,725
Berar	222	33	503	259	1,017	818
British Burmah	11	26	67	15	119†	122†

Deaths from "All other causes."

178. The deaths registered during the year as having been due to "All other causes," besides those which have been specially named, were as follows:—

Statement showing the deaths from ALL OTHER CAUSES *registered in the different Provinces in each month of* 1870.

PROVINCES.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL OF 1870.	TOTAL OF 1869.
Bengal Proper..	No statistics.						2,457	2,695	2,632	2,341	2,160	2,286	14,574	Not known.
North-Western Provinces ...	7,689	5,592	6,067	6,428	8,850	7,762	8,527	10,195	11,879	18,981	16,102	12,706	120,778	91,151
Punjab ...	6,762	5,742	6,359	6,381	6,827	5,676	5,790	6,388	8,335	8,717	8,205	9,188	84,370	30,953
Oude ..	3,750	2,949	3,342	2,988	2,660	2,545	853	1,103	1,070	1,160	1,038	926	24,384	46,446
Central Provinces ..	907	872	955	891	919	819	993	1,425	1,546	1,397	1,379	1,304	13,407	23,488
Berar ...	697	641	603	689	846	806	1,482	1,756	2,071	1,720	1,240	1,071	13,622	10,137
British Burmah	Not given by months.						...	...	...	...	...	...	3,805†	4,140†

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* These figures represent the deaths for six months only, July to December 1870.

† In 17 towns only.

179. The total mortality of the year is given in the annexed statement:—

Total mortality of the year by months.

Statement showing the deaths from ALL CAUSES *registered in the different Provinces in each month of* 1870.

PROVINCES.	January.	February.	March.	April.	May.	June.	July	August.	September.	October.	November.	December.	TOTAL OF 1870.	TOTAL OF 1869.
Bengal Proper ...	No statistics.						16,677	20,457	20,345	20,852	22,389	21,801	122,521	Not known.
North-Western Provinces...	23,626	18,060	21,565	24,221	35,740	27,801	25,254	31,470	41,030	86,284	83,897	61.430	480,378	529,753
Punjab	35,024	26,333	27,066	26,360	31,926	27,101	24,174	26,173	44,604	57,582	48,867	43,716	418,926	453,821
Oude	10,816	9,103	11,318	13,453	14,816	11,123	11,209	15,706	21,064	25,698	28,006	19,442	191,754	188,374
Central Provinces ..	8,102	7,112	7,512	7,420	8,331	7,189	8,201	10,989	12,793	12,836	12,141	11,797	114,423	174,998
Berar	2,004	2,110	1,913	2,336	3,163	2,697	4,978	7,691	9,464	7,250	5,411	4,855	53,872	47,338
British Burmah ...	Not given by months.												8,295*	9,369*

* In 17 towns only.

The total mortality according to causes as compared with that of 1869.

180. The number of deaths registered under the different heads in each Province may be conveniently seen in this further statement:—

Comparative Mortality in 1869 and 1870.

PROVINCES.	Cholera.		Small-pox.		Fevers.		Bowel complaints.		Injuries.		All other causes.		All causes.	
	1869.	1870.	1869.	1870.	1869.	1870.	1869.	1870.	1869.	1870.	1869.	1870.	1869.	1870.
N. W. Provinces ...	69,542	13,123	90,770	23,564	246,838	322,913	...	...	...	...	91,151	120,778	529,753	480,378
Punjab ...	9,258	469	53,195	27,163	272,946	275,093	30,953	27,249	4,832	4,582	82,637	84,370	453,821	418,926
Oude ...	23,134	15,318	21,564	11,048	87,795	122,816	6,235	10,386	3,200	7,802	46,446	24,384	188,374	191,754
Central Provinces ...	51,387	107	16,849	2,348	68,999	81,244	12,550	14,497	1,725	2,820	23,488	13,407	174,998	114,423
Berar ...	10,947	504	6,365	1,394	12,917	23,028	6,154	14,312	818	1,017	10,137	13,622	47,338	53,872
British Burmah* ...	1,025	250	1,037	188	2,415	3,061	630	884	122	119	4,140	3,805	9,369*	8,295*

* 17 Registration towns only.

Weekly and quarterly returns of deaths recommended by the Army Sanitary Commission.

181. In the month of July 1870 the Army Sanitary Commission suggested that a weekly return of deaths in large cities should be published, and that a similar return be made up quarterly for country districts. The local Governments to whom these suggestions were forwarded for consideration have acted differently in regard to them. The Punjab had previously published weekly returns of large towns, and similar statements have now been adopted in the Central Provinces, Oude, and Berar. The Government of the North-Western Provinces remarked that, without additional establishment, no funds for which were available, the desired statistics could not be framed, and the results of registration are here given only in the monthly statement, which shows the results for each district as a whole. In Bengal Proper also the authorities were of opinion that no returns could as yet be furnished except the monthly record, which had been only recently introduced, and the preparation of which required much attention. Quarterly returns have lately appeared for Oude, and they will also be arranged for in the Central Provinces.

Their general remarks on the mortuary registration system which has been adopted in India.

182. In making these suggestions regarding the returns from cities and districts, the Army Sanitary Commission remarked on the imperfect system of registration which had been adopted. They suggested that the whole scheme should be re-considered, and that a new plan of operations should be adopted as far as possible in conformity with that in force in other countries. But while fully admitting the imperfections under which the system which has been introduced into this country labors, it seems quite impossible, at least for the present, to devise anything better. Before the orders were issued the whole question had been very carefully considered both by the local authorities and by the Government of India. Had it been necessary to consider only the sanitary and statistical aspects of the question, forms in strict accordance with those in use in England might have been at once adopted; but it was obvious that the subject must also be regarded in its political, social, and economic light, while at the same time the extent to which the machinery necessary for the purpose already existed, or could be created, had to be looked to. The English system of registration of deaths rests entirely on the basis that every one whose death is recorded has been seen before or after death by a person who is competent to state what he died of. It need hardly be said that such a condition does not exist in India. In many districts there are thousands of square miles of country inhabited by hundreds of thousands of people, of whom not one is capable of stating the cause of death with any accuracy, except the single European Medical Officer at the chief station, and perhaps one or two Native Doctors attached to the Government dispensaries. The people, with rare exceptions—so rare that they need not be taken into account—die without ever having been seen by a medical attendant who could diagnose their disease. To introduce the English system as yet in India appears therefore to be an impossibility, and until medical knowledge is more widely available, any attempt at its introduction must fail. No amount of education or usage in the mere registering of deaths could ever teach the people what the cause of death had been. The case of the colonies even does not seem to have any parallel in India. Could registration be carried on in them or in England on its present footing, if there was only one qualified medical officer in each county? To introduce the English system into India, moreover, it would have been necessary to have passed an Act similar to that by which it is enforced in England; but until the people become somewhat accustomed to registration and are satisfied of the real objects which the Government have in view, any legislation on the subject is most undesirable. Considering then the peculiar difficulties to be met with in India, and the impossibility of introducing the English system, simple forms were adopted in which the chief object was to enter the number of deaths, but a few common diseases were inserted, such as the people are best able to distinguish. With regard even to them, simple as they are,

those who have practical acquaintance with the subject are well aware that there will be much serious error.

The importance of Vaccination as an integral part of State medicine in India.

183. The mortality which is due to Small-pox is year by year so heavy that the prevention of no one disease is of so great importance to the people of India. Vaccination is clearly an integral part of State medicine, and it will not be out of place to consider how it may best be conducted. Various systems have now been in force for some time, and yet none of them appears fully to meet the requirements of the case.

And the best means of conducting it.

In discussing this important question, there are certain general principles which must first be determined. The Government can never vaccinate the whole of the people of India who require protection from Small-pox; nor, even if this were possible, could it undertake to extend this protection year after year to the children who are added to the population. All that the Government can hope to do is to confer the benefits of vaccination on a certain very limited number of persons, to show the people by experience what vaccination professes to do, and what it really can accomplish, and, having taught them its value, to induce them to seek it for themselves. If the people were eager to receive vaccination, or if they were even generally willing to have it, the difficulties which now beset the department would be immensely reduced, and it would be easy, without increasing the establishment or the expense, to extend operations to a very much larger number than have yet been included in them. If these principles then be accepted as correct, and the soundness of them will not, I believe, be questioned by any one who has paid attention to the subject, the only point that requires to be discussed is how can they best be applied, how are the people most likely to be brought to understand the value of vaccination. I believe that this can best be done by concentrating the operations of the department on one particular tract running through each district. If such a tract could be thoroughly, or even only partially, protected from Small-pox, the inhabitants would have always before them the best evidence of the value of vaccination, and after a few years of such experience it seems almost impossible that they should fail to learn the lesson intended. The plan which has been adopted in the Central Provinces, of taking selected districts and confining the work of the Vaccine Department to them, appears to be open to objection. This system certainly affects concentration, but it affects it in such a way that the benefits are lost to the great mass of the population of the province. The people of one district, as a rule, know little of what is going on in other parts. They may hear that the inhabitants of such and such a district having had vaccination freely bestowed on them have escaped Small-pox to a remarkable degree, while other districts, including that in which they themselves reside, have suffered severely from the scourge. But this lesson would come home to them with much more force if the comparative exemption was evidenced in one given tract in their own immediate neighbourhood. A whole district, or even two or three districts in the province, may have escaped by one of those apparent and inexplicable freaks which so often occur in the history of epidemics. But if a particular tract running through each district displays the exemption, the lesson is repeated almost indefinitely, and becomes much more striking than it otherwise would.

The system now in force in the North-Western Provinces ~~is~~ recommended, because by having a Vaccinator attached to every tehseel, every native who chooses has the opportunity of having his child vaccinated; but if the tract of country were well selected in each district, running, as it should, as much as possible through the centre of it, the distance which any one would have to travel to obtain vaccination would not be very great. It would be easy, moreover, to arrange that a Vaccinator should be present for a few days at certain centres in each district to vaccinate all who are willing and anxious to have vaccination either for themselves or their children, and due notice might be given of the time and place of the intended visit. But it should be distinctly understood that the Vaccinator comes only to vaccinate those who really value it, and that he will not delay to urge its benefits on the attention of the people, or to endeavour to persuade them to have it against their own wish. In this way, by making as it were a favor of vaccination in every part of the district which does not lie within the selected area, I believe that the people would value it more than under the present system, by which they have a Vaccinator always present, and the favor would be more and more esteemed as the protection of the special area selected for vaccination became more perfect.

It will no doubt be long before this protection will be so complete as to ensure the absolute disappearance of Small-pox within its limits; but by concentrating the strength of the department on a single tract, instead of diffusing it over a large area, much would be gained in increased efficiency, and the supervision which is so essential to ensure a vesicle of good quality would be much more easy and satisfactory. Besides, in a limited tract of country more might be done to induce the officials and the natives of the better classes to do all they can to assist the work. For these reasons, it appears clear that the principle to be adopted is the principle of concentration, and that this principle can be acted on with every prospect of the best results, by taking a limited area running through each district, the tract of one district joining on to that of the neighbouring district, so that no more time may be spent in travelling than can be avoided. The tracts, moreover, should, so far as can be conveniently managed, include areas of rural circles of mortuary registration, so that the deaths from Small-pox may be shown in conjunction with the returns of persons vaccinated,—an excellent check on the work, and at the same time a valuable means of convincing the people that vaccination has really a protective power. Each Superintendent might arrange such a tour as I have sketched, and the plan would not of course interfere with the employment of Vaccinators by different municipalities, and the carrying on of vaccination within the limits of towns which do not fall within the selected area, and in which it is desired. The principle of rotation which has been adopted in the Punjab appears to possess no advantages. By this arrangement it would be impossible to make such a decided impression on the people as desired, or to teach them with the same force the value of vaccination.

Many matters of interest must be passed by unnoticed.

184. There are many other matters of interest,—such as the arrangements which are now under consideration for regulating the transit by rail of persons suffering from Small-pox and other contagious diseases, the successful termination of the Mecca pilgrimage of the year, the question of quarantine in the Red Sea, the provision of a better diet and of a purer water-supply for emigrants sailing from Calcutta, and the great mortality which occurred in certain emigrant ships,—all of which have a more or less direct bearing on the sanitary history of the year; but this report has already extended to so great a length that I shall confine myself to a few observations on two subjects of special interest,—the health of the town of Calcutta and the discoloration of the lake at Nynee Tal.

Marked improvement in the health of Calcutta in 1870 coincident with the new water-supply.

185. The very marked improvement in the health of the town of Calcutta, which has characterized 1870, and which has been coincident with the introduction of a good water-supply, deserves special mention. Comparing the statistics of mortality with what they have been previously, it appears that in 1870 the deaths from cholera numbered only 1,563, less than one-half of what they were in the year previous, and very

little over one-half of what they were in the most favorable year of which there is any record. Between 1841 and 1860 the annual deaths from this one cause varied from a minimum of 2,502 in 1848 to a maximum of 6,553 in 1860. From 1861 to 1864 no records are procurable; but the later years, 1865 to 1869, present quite as many fatal cases in each as are to be found in the earlier period. Dysentery and Diarrhœa in 1870 were also at a minimum which had never been reached before. The results as a whole were also singularly favorable. It is too early to draw any definite conclusions from these facts, for it remains to be seen how far the results may be properly ascribed to a better water-supply and to the new drainage, and how far they merely represent the healthy character of the year; but there can be no question that the sanitary improvements which have been introduced into Calcutta of late years are calculated to have a marked influence on the public health, and that the greatest benefit may be anticipated from them.

Discoloration of the lake at Nynee Tal owing to infusoria.

186. In 1870 the lake at Nynee Tal assumed a dark-red color, and fears were entertained that this piece of water, which is of great use in supplying the inhabitants, and is also at the same time the chief ornament of the sanitarium, had become seriously and permanently deteriorated. These fears were greatly increased by the report of the analyst who was specially sent to examine the water. In his opinion, the yearly addition of sewage, which to a certain extent flowed into the lake, especially from the neighbouring bazaar, had at last culminated in very evil results, and the presence of these small infusoria, which existed in countless number, and imparted the strange color to the water, might be attributed in great measure to the contamination to which it had for years been subjected. But a more careful examination showed that these fears were altogether groundless. The lake being about three-quarters of a mile in length, with a breadth varying from about one-quarter to half a mile and of great depth, contains a vast body of water; and in this body, especially in the rainy season, constant changes are taking place. Moreover, the conservancy of Nynee Tal had received much attention, and although, no doubt, some impurities find their way into the water, partly because of the steep hills which immediately surround it, but chiefly from the faulty position of the bazaar, it seemed highly improbable that the sudden development of such a large number of infusoria could be explained on any such hypothesis. Dr. Lewis stated that in his opinion the infusoria belonged to the family known as *peridinea;* that there was no reason to suppose that their presence had been due to impurity in the water; that on the contrary their presence is generally a guarantee that it is clean. His opinion has been verified as to the family to which these infusoria belong by Mr. Carter, who pronounced them to belong to a new species of *ceratium*, which he proposes to call *ceratium kumaonense.* It appears that they are very common in other lakes of Kumaon,—lakes many of which are far removed from human habitation and into which sewage could hardly have entered. The ordinary beautiful blue color of the Nynee Tal lake was for months changed to a dusty brown, owing to the presence of myriads of these infusoria. They were perfectly visible to the naked eye, chiefly on the surface, and 10 to 20 feet below it. Lower down there were very few.

Association of the Sanitary Department with the Department of Agriculture, Revenue, and Commerce.

187. In conclusion, I may mention that in June of the current year the Sanitary Department, which on its first institution had been attached to the Military Department of the Government, and afterwards transferred to the Home Department, was in the month of June of the current year associated with the new Department of Agriculture, Revenue, and Commerce, which was then created. Public health and public wealth are very intimately connected, and as this new department has for its special object the better development

of the resources of the country and of the material prosperity of the people, it seems peculiarly appropriate that it should embrace the health service, the work of which is to obtain information regarding the increase and decrease of the population, the circumstances which further the spread of disease, and the measures of improvement which are required in different localities.

J. M. CUNINGHAM, M.D.,

Sanitary Commissioner with the Government of India.

APPENDIX A.

GENERAL REVIEW

ANNUAL REPORTS OF THE LOCAL SANITARY COMMISSIONERS

1869,

J. M. CUNINGHAM, M.D.,
SANITARY COMMISSIONER WITH THE GOVERNMENT OF INDIA

APPENDIX A.

GENERAL REVIEW OF THE ANNUAL REPORTS OF THE LOCAL SANITARY COMMISSIONERS FOR 1869.

No. 309, dated 25th May 1871.

From—The Sanitary Commissioner with the Govt. of India,
To—The Secretary to the Government of India, HOME DEPT.

With reference to the correspondence noted in the margin, I have the honor to submit a general review of the Annual Reports of the local Sanitary Commissioners for the year 1869.

From Home Department, No. 864, dated the 27th September 1870.
To Home Department, No. 478, dated the 29th idem.

2. These reports reached me in the following order and on the date which is noted opposite to each of them:—

Several of these reports were very late in submission.

From	Berar ...	... 13th June 1870.
„	Punjab ...	... 11th October 1870.
„	Oudh ...	... 22nd October 1870.
„	British Burmah ...	... 22nd October 1870.
„	Bengal ...	... 11th November 1870.
„	N. W. Provinces ...	... 30th November 1870.
„	Central Provinces...	... 2nd March 1871.

3. Although somewhat earlier of arrival than they were in the year previous, they all, with one exception, came too late to be of use in the preparation of my general report for 1869. The year was characterized by unusual sickness; cholera, small-pox, and fever were extremely prevalent over great portion of the country, and the matters which demanded investigation were therefore much more numerous and important than ordinary. In estimating the time occupied in the preparation and submission of the different reports, regard must be had to the manner in which these investigations have been conducted and recorded. For example, the report of the Sanitary Commissioner of the Central Provinces did not reach this office till the 2nd of March 1871; but it contains the results of a most painstaking enquiry into the great epidemic of cholera from which the people in those provinces suffered so heavily in 1869, and this enquiry was in a great measure conducted during the early part of 1870, in the course of a tour through that part of the country which had been chiefly affected.

The delay was in a great measure caused by the great sickness and the many important matters which consequently demanded attention.

4. But while making every allowance on account of the work which attends on the proper discharge of the duties of the Sanitary Commissioners, it is indispensable that their annual reports should be submitted at a much earlier date than hitherto. The statistics of sickness and mortality among the troops and prisoners cannot be considered with any degree of satisfaction apart from the history of disease among the people generally. All the information which can be procured from every source must be examined at one and the same time, and the Sanitary Commissioners will therefore, I trust, submit their annual reports in future in time to enable me to have the advantage of studying them in connection with the statistics of troops and prisoners, and so to prepare a full and complete report for the year regarding all sections of the community.

It is very important that these reports should in future be submitted at a much earlier date.

5. The division of their reports into certain sections, which I recommended last year, has not been followed by all the Sanitary Commissioners, nor, indeed, has it been fully adopted by any of them; but I shall endeavour, as far as possible, to keep to such an arrangement in this general review of their contents; and I would at the same time observe that if some such division as I have proposed, or any other which the Government may think best, were generally followed by all the local Sanitary Commissioners, it would greatly facilitate reference, and thereby materially aid not only in summarizing the facts collected from various sources, but also in drawing deductions from them.

No general plan has been followed in these reports.

6. I shall now proceed to consider the information which these reports contain as regards—

Their contents will be considered under six heads.

I.—Vital statistics.
II.—The history of each of the chief diseases as it affected the several provinces during the year.
III.—The meteorology.
IV.—The general condition of the people as influenced by any deficiency in the crops, or by the unusually high price of food.
V.—The personal investigations and proceedings of the Sanitary Commissioners.
VI.—Sanitary progress during the year.

Any prominent facts contained in the Madras and Bombay reports for 1869 will, at the same time, be noticed.

7. Although the Madras and Bombay reports do not properly fall within this review, I shall take advantage of the opportunity of collecting from them any prominent facts which illustrate the history of disease or the sanitary condition of the people in those parts of India.

Section I. Vital Statistics.

None are available regarding the Lower Provinces.

8. With the exception of a few statements regarding cholera in some districts, and these are confessedly inaccurate and incomplete, the Sanitary Commissioner for Bengal gives no vital statistics for his province. In his remarks on this most important question, Dr. Smith observes that it had been intended to commence mortuary registration from the 1st of November 1869, but that, owing to unforeseen difficulties, its introduction was postponed till the 1st July 1870. How far these arrangements have actually been carried into effect, I am not aware; but judging from the very imperfect information which is obtainable regarding cholera in the several districts of the Lower Provinces during 1870 and during the past months of the current year, it would seem that the system is not yet in good working order.

The want of this information is a great loss, especially as regards the history of cholera.

9. Bengal Proper is the only province of India from which no statistical information regarding the deaths among the people in any part of it during the year 1869 can be obtained. In the North-Western Provinces, the Punjab, Oudh, the Central Provinces, and Berar, a general system of mortuary registration has been for some time in operation. In British Burmah it has as yet been confined to 17 towns, but, with the single exception of Calcutta, no information can be obtained regarding the number of deaths among the people in any part of the Lower Provinces. The want of such data is a serious loss as regards the mortality attendant on all diseases, but the want is chiefly felt in connection with the history and geographical distribution of cholera. If the delta of the Ganges be the home of this disease, then every fact connected with its appearance within the limits of this endemic area, and with its progress beyond these limits, is of the greatest importance. But in truth, without vital statistics, the Sanitary Commissioner wants the foundation on which all his other work must be built. The supervision of the registration of deaths amongst so large a population, and over so great an area as that of the Lower Provinces, is undoubtedly no small work, but it is one which is of primary importance and which much demands attention.

For the North-Western Provinces they are imperfect.

10. The registration of deaths in the North-Western Provinces shows that 1869 was a year of very unusual sickness and mortality. All the great causes of death—cholera, small-pox, fevers, and bowel complaints—were very prevalent. The comparative results in different districts, as shown in the one general table which is given in the body of the report, appear to convey a tolerably correct estimate of the relative prevalence of these diseases; but the mortality must be greatly under-stated, and thousands of deaths must have escaped registration. The death-rates vary in different districts from 5·8 per 1,000 in Bustee—a ratio which must be the result of very imperfect registration—to 56 per 1,000 in Jhansie, where famine and terrible sickness told heavily upon the people. The total death-rate of the province is given as 17·9. The details which are furnished in Appendix A are manifestly incorrect. The new scheme of registration had not then come into force, and the particulars which have been given regarding the causes of death during the year, such as a "broken heart," "eating mud," and many others which might be instanced, are chiefly valuable as illustrating the necessity of a better system. During the last few months the standard forms have been brought into use, and the results of each month's registration are regularly published in the *North-Western Provinces Gazette*.

In the Punjab they are more complete, and bear evidence of greater accuracy.

11. In the Punjab, where the importance of a good system of registration has from the first attracted the attention which it so justly deserves, the details are much more complete and bear the impress of greater accuracy than those of the North-Western Provinces. Much still remains to be done before the returns can be accepted as embodying more than an approximation to the truth; but "lamentably imperfect" as they are still admitted to be by the Sanitary Commissioner, they are yet of great value, not only for the information which they contain regarding the general history of disease, but as the basis of more successful results. The death-rate for the province was 26 per 1,000, varying from a minimum of 16 to a maximum of 38 in different districts. In the towns, the statistics of which, although included in the district tables, are also shown separately, the death-rate equalled 35 per 1,000,—a result which points rather to greater accuracy than any special mortality. In some of them the death-rate was extremely high. At Umritsur it was 69, at Delhi 46, at Sajanpore in the Goordaspore District 80, and at Dera Nanuk in the same district 84 per 1,000. A very important step has been taken in making the heads of families responsible for reporting all births and deaths. As a commencement, this rule has been applied to only the principal station of each district (excepting Umballa and Abbottabad, which have for the present been omitted); but the Sanitary Commissioner recommends that it should be gradually extended, as the people come to understand the uses and object of registration, until

at last the whole province is included in its operation. The new standard forms for showing the results of registration had not been introduced. Some delay had occurred owing to a reference on the question of establishment required for the purpose, but monthly statements in the prescribed form now appear in the local Gazette. The statements which the Sanitary Commissioner has appended to his report afford much information, but it is very desirable that one and the same system should be adopted throughout India. Without this comparison is almost impossible, and no satisfactory examination can be made of the returns from the different provinces without an infinity of labor, which may, to a great extent, be obviated by uniformity.

The details from Oudh are meagre.

12. All the data regarding the deaths and causes of deaths in Oudh during the year 1869 are contained in one table in the body of the report. The deaths registered from all causes equalled 16·8 per 1,000,—a ratio which, especially in a year of such great sickness, must be much under the truth. In different districts it varied from 9·1 to 35·6 per 1,000. The information is very meagre and imperfect, nor is mention made of any measures which have been taken with a view of obtaining more reliable results. With the introduction of the new standard forms, some improvement may be expected, but it does not appear whether arrangements have yet been made to adopt these forms or not. As yet no monthly statements have appeared in the local Gazette, in conformity with the instructions which have been issued by the Government of India.

In the Central Provinces, as in the Punjab, registration has received much attention.

13. In the Central Provinces the proportion of the population under systematic registration in 1869 was much the same as in the year previous; but when cholera became prevalent, it was extended to the whole of the people, with the exception of those in the feudatoryships and zemindarees which are not under the direct administration of the Government. It thus happens that while the information regarding the other great causes of deaths refer to 4,862,516, the details regarding cholera include 6,879,738. With the commencement of 1870, the new forms have been brought into use, and the whole of the inhabitants, with the exception of those in the zemindarees and in some of the more distant villages of the wilder districts, have been embraced in the registration. Dr. Townsend's mortuary tables for the year, although still confessedly imperfect, afford very valuable information and evince the care and attention which, in the Central Provinces as in the Punjab, have been bestowed on the subject of registration. The total death-rate for the province on the deaths registered was 35·9, varying from a minimum of 11·6 in the district of Seroncha to 63·1 in the district of Jubbulpore. In many of the towns the loss of life was terrible. In twenty-three of the forty-five, regarding which particulars are given separately, the ratio was over 40 per 1,000. In fifteen of the twenty-three, it was over 50, and these fifteen again contain instances of mortality rising to 60, 70, 80, 90, 100, and in the case of Jubbulpore to 123 per 1,000.

Berar was not placed under a separate Sanitary Commissioner until April 1870.

14. Berar was taken from the Central Provinces and placed under a separate Sanitary Commissioner only on the 2nd of April 1870. The population under registration in 1869 amounted to 2,074,614, or nearly 93 per cent. of the whole people of the province. The registered deaths give a ratio of 22·8 per 1,000 of the population. In the district of Woon it was only 14·9, in Oomraotee 30·4, and between these extremes there were varying rates of mortality. The standard forms, it is noted, were to have been brought into use in 1870. It is very desirable that the monthly results should be published for general information. In the absence of any local Gazette, the statement might conveniently appear in the Gazette of the Central Provinces.

In British Burmah only 17 towns had been embraced in the registration.

15. In British Burmah the registration of vital statistics had been introduced into only 17 towns; but from the 1st July 1870, a system based on that laid down by the Supreme Government for the whole of India was to come into force. The Chief Commissioner trusted that, with care and attention on the part of District Officers, statistics for the whole province would thereafter be obtained.

The returns from Mysore being for the official year, are not comparable with the others.

16. The statements from Mysore relate to the official year 1869-70, and cannot, therefore, be compared with those of the other provinces which embrace the year 1869. Moreover, the death-rate of about 8 per 1,000 which these statements show, as the Chief Commissioner remarks, cannot but be regarded as much too favorable, and many deaths must have been left unreported. From the 1st July 1870, the new system of registration was to be introduced, and it was hoped that more accurate results would then be obtained. The total population of Mysore, it may be noted, is stated to be 4,056,766, of which the details are as follows :—

Europeans	4,151
Eurasians	2,855
Native Christians	8,186
Mahomedans...	189,272
Hindoos	3,839,679
Budhists and Jains	12,623
TOTAL ...	4,056,766

Registration in Madras and Bombay Presidencies.

17. The total population of the Madras Presidency is estimated at 26,097,021, and of these 24,633,127 had been included in the registration, the difference representing zemindaree tracts and remote villages from which it had not been found practicable to obtain returns. The returns show a total mortality of 18·3 per 1,000, but, as the Sanitary Commissioner remarks, the deaths are in all probability much under-stated. The ratios vary in different districts from 9·8 to 24 per 1,000. From the 1st July 1870 the standard forms were to be employed.

The population under the Government of Bombay in 1869 is estimated at 13,901,863. A general statement is given for the year, and details regarding the civil population of each Collectorate. The total death-rate is estimated at 20·4 per 1,000. It does not appear what orders have been issued regarding the adoption of the new forms, but the Sanitary Commissioner observes that the attempt to obtain information regarding the causes of death, in even the most simple form, had hitherto failed; and it was feared that a general classification such as that adopted in the new statements, which is somewhat more complicated than that hitherto in use, could not be followed with accuracy.

The general mortuary statistics of India, so far as obtainable, are shown in the annexed table.

18. In the annexed statement, the general results of mortuary registration are shown throughout British India :—

Statement showing the number of deaths registered in the various Provinces of British India during the year 1869.

PROVINCE.	Estimated population.	Population under registration.	NUMBER OF DEATHS FROM						Total deaths.	Ratio of deaths per 1,000.
			Cholera.	Small-pox.	Fevers.	Bowel complaints.	Injuries.	All other causes.		
Bengal	...	...	No Statistics.							
North-Western Provinces ...	29,588,658	All	69,542	90,770	246,838	31,452	Not stated	91,151	529,753	17·9
Punjab	17,448,865	do.	9,258	53,195	272,946	30,953	4,832	82,637	453,821	26·
Oudh	11,198,095	do.	23,134	21,564	87,795	6,235	3,200	46,446	188,374	16·8
Central Provinces ...	9,000,000	4,802,516	51,387	16,840	68,999	12,550	1,725	23,488	174,998	35·9
Berar	2,231,566	2,074,614	16,947	6,365	12,917	6,154	818	10,137	47,338	22·8
British Burmah	2,395,985	322,728	1,025	1,037	2,415	630	122	4,140	9,369	29·
Madras	26,097,021	24,633,127	21,034	17,448	132,346	Not stated separately.	9,445	271,708	451,981	18·3
Bombay	13,901,863	All	52,365	12,673	Not stated separately.	Not stated separately	4,719	Not stated separately.	283,878	20·4

The statistics are not yet sufficiently accurate for any satisfactory analysis.

19. The returns are still too imperfect to admit of any satisfactory analysis of their contents beyond what is here exhibited. The relative mortality among the rural as compared with the town population, the comparative death-rates at different ages and among the two sexes, as well as the proportion due to particular months and seasons, are all questions of very great interest, but no correct data are yet available for their consideration. It will be observed that the highest mortality 35·9 per 1,000 occurred in the Central Provinces, where the great epidemics of the year sufficiently account for the results. Next follows British Burmah, with a death-rate of 29 per 1,000, but the returns are collected from a very limited portion of the population. In the Punjab the ratio was 26, and in the other provinces it varied from 22·8 in Berar to 16·8 in Oudh. Judging from the very unhealthy character of the year, the deaths in the North-Western Provinces, in Oudh, and also in Madras and Bombay, would appear to be much under-stated. As most of the Sanitary Commissioners remark, the errors in the registers are errors of omission, and had all the deaths been entered, the ratio for all the provinces would doubtless have been more or less in excess of those which are here represented.

The registration of births, though attempted in several of the Provinces, is very imperfect.

20. No mention has yet been made of the registration of births. In several of the provinces, and especially in the Punjab, the Central Provinces and Oudh, attempts have been made to collect data on this important point; but the difficulties which attend such an attempt are very much greater even than those connected with the registration of deaths, and the results as yet are very imperfect.

Considering the great difficulties which have to be encountered, the results of registration in 1869 are encouraging.

21. On a review of all that has as yet been done to introduce a general system of registration among the people of India, it must be admitted that the results of 1869, imperfect as they are, contain most important information, and encourage the hope that they will year by year improve and increase in value. The difficulties which have to be contended with in carrying out any such

system in India are but little understood and appreciated by those who have had no experience of the country, and whose ideas of registration are derived from what has been done in Great Britain. The vast area embraced in each province, the millions of people to be included in the registration, the fact that in many districts, each of which is larger than a county of England, and many of them as large as several counties put together, there is generally but one educated medical officer who could accurately certify to the cause of death in any case, and the want of proper machinery for registration are all obstacles of no small magnitude; and regarding what has been effected in relation to these difficulties, I am rather astonished at what has been done than disappointed at the errors and omissions. The system is yet in its infancy; it is new to the people; and, until they in some degree understand its aim and objects, they will not render that willing assistance which is indispensable to its success. The special attention of the Sanitary Commissioner in every province should be devoted to registration—it is, as I may say, the backbone of their work—and, where it is neglected, the sanitary condition of the people can never improve and flourish. When the results of registration for 1870 come to be reviewed, it is, therefore, to be hoped that no province will be found without its vital statistics collected and compiled with the greatest care, and that all the Sanitary Commissioners will evince the same appreciation of the value of mortuary registration as has been shown by Dr. DeRenzy in the Punjab, and by Dr. Townsend in the Central Provinces.

SECTION II.
History of the chief diseases during the year.
A.
Cholera was very prevalent in 1869.

22. I shall now pass to a consideration of the diseases which chiefly contributed to the mortality of the year, and of these the first on the list, though not the most destructive in all the provinces, is cholera. In nearly all of them cholera was extremely and unusually prevalent, and it would be impossible within the limits of any general review to enter fully into the history of this vast epidemic. Its main features have already been discussed by Dr. Bryden, in connection with the views which he has expressed in his work on cholera—its geographical distribution and relation to natural influences. I shall only attempt to state shortly the most important facts which have been recorded by the Sanitary Commissioners in their respective reports, and shall then consider the opinions which they have based upon them. My object is not to urge any particular views with regard to the disease, but merely to examine the evidence which has been adduced, and to ascertain how far any of the theoretical opinions, which have been advanced in explanation of the facts of the epidemic, are supported by this evidence.

Very little information is to be had regarding its appearance in Bengal.

23. As deaths were not registered in Bengal during 1869, no precise information can be obtained regarding the disease. The Sanitary Commissioner has summarized all the data which he could procure, but from several districts no reports were received, and in none of them have the facts been so fully and carefully recorded as to embody any connected and complete history of the disease throughout the year. Without registration no such data can be obtained. So far as can be judged from the statements of the Civil Surgeons, cholera was severe in the Bhaugulpore, Monghyr, Gya, Patna, Sarun, Tirhoot, and Chumparun Districts of Behar, and also in Assam. Some few instances are given in which the disease appears to have been spread by human intercourse, but the Sanitary Commissioner does not incline to the opinion that this was the agency by means of which it was disseminated. "It may be asked," he observes (page 43), "could quarantine operations of the most complete and perfect description have put a stop to the spread of cholera during the past year? I believe it would have failed to do so, because there is much evidence to show that the disease appeared simultaneously and independently in many places; because, in a large number of such instances, although special enquiries were instituted on the subject, importation could not by any means be traced; because in certain localities free communication with infected places went on without any manifestation of the disease occurring; and *lastly*, because its often sudden and simultaneous disappearance over broad tracts of country tends to prove its dependence on influences far other than those of mere human agency." Within the endemic limits of cholera, any investigation into the share which human intercourse may have in spreading the disease is beset with peculiar difficulties; but such facts as Dr. Smith here records are of great importance in the enquiry and are well worthy of being recorded in detail. Without specific evidence as to dates and places, and the number of cases or of deaths, it is impossible to form any correct opinion with regard to them. No map has been furnished with this report to illustrate the distribution and comparative incidence of cholera in different parts of Bengal, but, in the absence of any statistics for the province, it could not well have been prepared in such a way as to be of any real value.

In the North-Western Provinces the mortality from cholera was very heavy.

24. In the North-Western Provinces the mortality from cholera was very heavy. No less than 69,542 deaths are recorded under this head, or 2·3 per 1,000 of the population. The disease was, however, by no means equally distributed. The districts of Lullutpore, Ghazeepore, Jaloun, Azimgurh, Jhansie, Mirzapore, Benares, Goruckpore, Humeerpore, and Bustee suffered most, the ratio varying from 10·9 in the first of them to 3·0 in the last. From three districts—Kumaon, Gurhwal, and Turaie—no deaths from cholera were reported. In fourteen of them the mortality from this cause was under 1 per 1,000, and in the remaining

eight it was from 1·3 to 2·8 per 1,000. In eighteen out of the thirty-five districts of the province, deaths from cholera were recorded in every month of the year. The statistics regarding the Police, the accuracy of which can be relied on, show that the force suffered most in those districts in which the mortality among the general population has been recorded at the highest,—evidence which, as the Sanitary Commissioner's remarks show, that, although the records of the general registration are inaccurate as regards the actual number of deaths, they are not altogether valueless, and contain a fair estimate of the relative incidence of the disease in different parts of the country. No map accompanies Dr. Planck's report.

The severity of the disease in the Punjab was confined to a few places.

25. With the exception of Muzuffergurh, every one of the thirty-two districts in the Punjab suffered from cholera, but the severity of the disease was confined to a few places. In twenty-one of the districts the mortality from this cause did not exceed 0·10 per 1,000. In seven of them it was above 0·10, but under 1·0 per 1,000. In the Kohat District it was 3·62, in Umritsur 4·33, and in Peshawur 5·99, per 1,000. On these last three the chief violence of the epidemic fell; but even this does not show the remarkable localization of the severity of the outbreak, for the mortality, although shown for the districts as a whole, really fell chiefly, and in the case of Umritsur almost entirely, on the capital city: the rural population suffered little. Thus, in the Peshawur District as a whole, there were 2,985 deaths from cholera reported, but of these 1,480 occurred in the city. In the Umritsur District, out of 3,608 deaths, 3,041 were in the city. In the Kohat District, out of 508 deaths, 328 took place in the city and cantonment. Of the total of 9,258 deaths from cholera, it thus appears that no less than 7,101 occurred among the people of these three districts, and of these again 4,849, or nearly five-sevenths, occurred among the people of the three cities. Some particulars are given regarding the outbreaks at these places, and also regarding the disease as it appeared at Lahore, Goordaspore, Jullundur, Hissar, Sirsa, Subathoo, Rawul Pindee, and Bunnoo. To attempt to state even the main facts regarding its history in all these districts would be to recapitulate much of what Dr. DeRenzy has already so well described. Some of them must, however, be considered when I come to discuss the opinions which he has expressed with regard to them. Two maps illustrate the report—one showing the relative prevalence of cholera for the whole province, and the other the details regarding the epidemic in the Peshawur valley.

Particulars regarding the cholera in Oudh are wanting.

26. It appears from the general table already given that in Oudh 23,134 persons died of cholera during the year 1869, or a ratio of 2·0 per 1,000. The disease was epidemic over nearly the whole province, but no particulars are given beyond the data which appear in the general table. The deaths varied from 0·09 per 1,000 in the Kheree District to 6·1 in Rae Bareilly. No map accompanies the report, nor is there any record of the number of deaths which occurred in each month; but this last information was subsequently supplied at my request, and a table embodying it appeared in my annual report for 1869. There was a marked persistence of the disease throughout the province, especially in the districts of Fyzabad, Sultanpore, Seetapore, and Pertabgurh.

A very full account of the history of cholera in the Central Provinces has been given by Dr. Townsend.

27. The epidemic in the Central Provinces was made the subject of a most painstaking and careful enquiry; great part of the country which chiefly suffered was visited by Dr. Townsend, and the facts investigated on the spot. Out of a population of 6,879,738 to which the registration of the mortality from cholera was specially extended, 57,079 deaths from this disease were recorded (Table No. 20). As shown in Table No. 18, out of a more limited population of 4,862,516, the deaths were 51,387, or 10·5 per 1,000. The severity of the disease fell chiefly on the people in the Mundla, Saugor, Dumoh, Belaspore, Raepore, and Nursingpore Districts, in which the mortality it occasioned varied from 21·3 in the first to 10·4 in the last. In Seroncha no deaths were reported. In the remaining twelve districts the ratio of loss from cholera was from 9·9 in Wurdah to 0·4 in Chindwarra. In the town of Mundla the cholera death-rate was no less than 53·2, in Raepore it was 34·2. Many other towns suffered severely. From these facts it will be seen that the disease was both wide-spread and very fatal,—very much more so than in any of the other provinces. In 1868 it had also been severe in the Central Provinces, but the area over which it then appeared was more confined, and the deaths numbered only 10,400 as compared with 57,079 in 1869. The excessive mortality in these two years may again be contrasted with the singular immunity which the people have enjoyed in 1870, when, throughout the whole province, only 120 deaths from cholera have been registered. The details of certain outbreaks which are given by Dr. Townsend are of much interest. A map accompanies the report, and is of great assistance in studying the incidence and progress of the epidemic.

In Berar the disease was very generally diffused.

28. In Berar 10,947 deaths were ascribed to cholera during 1869, or 23·1 per cent. of the total mortality. The ratio of loss varied in the districts from 4·7 in Bassim to 8·76 per 1,000 in Oomraottee; in the cities from 2·1 in Bassim to 8·4 in Akolah. The epidemic was very generally diffused throughout the whole province, but no very excessive mortality appears to have occurred in any one place. The Sanitary Commissioner, as I have already stated, did not assume charge till April 1870, and has been unable fully to detail the history of the outbreak, or to supply any map in illustration of his report.

The information from Burmah relates only to 17 towns.

29. As the statistics in British Burmah were confined to 17 towns, the information regarding the general history of the disease throughout the province is incomplete. In all but four of them deaths were attributed to cholera, and in Akyab there was a severe outbreak to which 700 deaths were supposed to be due. No map accompanies the report.

The annexed statement shows the monthly mortality from cholera in each of the provinces.

30. In the annexed statement the extent of the mortality from cholera in each province for each month of 1869 has been entered, and, for the purpose of comparison, the returns from Madras and Bombay have also been included. In the report of the Sanitary Commissioner for Bombay I have been unable to find a full detail of the deaths by months, but at page 197 he writes:—"The season of greatest prevalence of cholera in 1869 was during the three months—May, June and July—during which considerably more than half the total fatal cases of the whole year occurred. The greatest number of reported deaths is in July, but the difference is trifling, the figures for the three months being 9,679, 9,525, and 9,764, respectively. December shows the lowest figure—275." In Madras the first maximum was in July, the disease then declined till October. In November it again rose, and in December it was nearly as fatal as it had been in July. In the North-Western Provinces and also in the Punjab the highest point was reached in August; till then it had gradually ascended, and from then it gradually diminished. In Oudh there was a first decided rise in June, a lull in July, and then a higher rise than ever in August. In the Central Provinces the mortality from cholera gradually rose during the first five months of the year. In June the deaths were nearly twice as numerous as in any other month, and then they steadily declined.

Statement showing the deaths from Cholera registered in the different Provinces in each month of 1869.

PROVINCE.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	ber.	mbe	Tot.
Bengal Proper ...	No	statistics.											
North-Western Provinces	151	216	1,284	3,148	4,937	11,394	14,339	21,092	6,909	4,318	823	180	68,691
Punjab	18	32	51	76	144	194	797	3,238	2,391	2,033	204	80	9,258
Oudh	327	177	689	2,014	3,394	4,149	3,548	4,239	1,725	1,521	491	200	23,134
Central Provinces ...	70	134	749	1,837	9,799	22,823	12,077	7,050	2,127	391	16	6	57,079
Berar	10	70	139	1,759	1,385	770	3,047	2,618	818	164	18	110	10,947
British Burmah ...	No stati	stics for	months.										
Madras	175	203	475	446	477	2,575	5,025	3,100	2,424	1,907	2,198	4,067	23,072
Bombay	No stati	stics for	months.										52,365

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* These totals do not in all cases agree with those given in the previous statement; but as the object of this Table is to illustrate the comparative monthly incidence of the disease, the discrepancies are of little consequence.

The opinions of the Sanitary Commissioner of the North-Western Provinces with regard to the epidemic are chiefly negative.

31. I shall now proceed to discuss the opinions which have been expressed by the different Sanitary Commissioners with regard to this great epidemic as it affected their respective provinces. The data from Bengal are so imperfect that no satisfactory conclusions can be drawn from them. Dr. Smith's views have already been cited in connection with the few facts which have been recorded, and no further reference need, therefore, be made to the disease as it appeared in this portion of the country. Taking the statistics of the North-Western Provinces for 1869, and considering the persistence with which cholera showed itself, appearing in not a few of the districts in every month, and in others in nearly every month of the year, Dr. Planck is inclined to believe "that cholera is always to be found in some part or other of almost every district from one year's end to the other" (page 8). In the eastern districts especially the general opinion seems to be that the disease is endemic, and the Sanitary Commissioner thinks it "not unjust to suppose that the permanent home of cholera is extending from east to west, and that, consequently, the people of the North-Western Provinces are more and more likely to have the disease amongst them in an epidemic form in coming years." "That the rapid means of communication now in existence are likely to increase this tendency," he adds, "I think there can be no doubt." With regard to the first of these statements, it is difficult to form any correct opinion, because there is no doubt that very many of the deaths which are ascribed to cholera, especially in non-epidemic years, are really due to other diseases, such as bilious fevers. The second remark would seem to imply that Dr. Planck believes in human intercourse as the chief means of spreading cholera; but the facts which he has recorded regarding the epidemic in the North-Western Provinces during 1869 do not tend to this conclusion. Seven instances only are cited in which it was attributed to importation (paragraph 35). "In all other districts, either satisfactory evidence of its importation is said to be wanting, or its importation denied." "As regards the spread of the disease by personal intercourse,"

he continues, "and the danger to friends or other persons attending on cholera cases, the evidence is re-assuring. With the exception of Meerut and Boolundshuhur, the evidence from all the districts is, that no facts have come to notice showing that the disease has been so spread, or that any unusual danger attends the ministering to cholera patients." His general opinion regarding the epidemic is thus recorded:—"Concerning the cause of cholera, or the mode of its distribution, nothing definite, so far as I know, has been recorded in the past year; even the belief that cholera is distributed by means of the water-supply has been, I think, a little disturbed by a record of the fact that wherever cholera prevailed, those attacked and those who escaped drank from the same wells." These conclusions are of only a negative character, but it is very much better to confess ignorance than to advance theoretical opinions which cannot be substantiated by facts. It appears to me that in any future epidemic very searching investigation should be made into its history. It would be quite impossible for the Sanitary Commissioner to visit more than a very small portion of the province during any one season,—for the great mass of information regarding the disease, he must be dependent on his mortuary statistics and the reports of the Civil Surgeons; but if one district or even a part of a district in which cholera had been most prevalent and fatal in 1869 had been selected for careful enquiry in the cold weather of 1869-70, much valuable information might have been obtained. Dr. Planck is of opinion that the great measure required for the prevention of cholera is "the improved sanitation of the province generally, and especially of the principal centres of population," and of the soundness of this conclusion there can be little doubt.

The opinions of the Sanitary Commissioner of the Punjab are very decided.

32. Dr. DeRenzy's views as to the mode in which cholera is spread over any province, and the medium through which it generally attacks a community with special violence, are very decided. At page 101 of his report he states, with reference to the first of these questions, "a humid atmosphere is as incapable of transporting the cholera virus from place to place as it was of transporting the potatoe from its original habitat to Ireland, the cinchona to Darjeeling, or the tea-plant to our own Kangra Valley. In those cases human agency was indispensable to the transfer; it is equally so in the case of the cholera virus." On the second point he writes (page 104):—"when it was demonstrated in London that of all the conditions which favor the propagation of cholera, *viz.*, exposure to infection, bad drains, crowding and defective ventilation, poverty, and the unclean habits which too often attend it, low damp residence, imperfect medical relief, and water tainted with cholera discharges—the most influential was cholera-tainted water, it was practically established that the same relative importance would attach to this condition in all other parts of the world." Dr. DeRenzy, in fact, adopts Dr. Snow's water theory, "that the cholera poison is swallowed and acts directly on the mucous membrane of the intestines; is at the same time re-produced in the intestinal canal and passes out much increased in the discharges; and that these discharges afterwards in various ways, but chiefly by becoming mixed with the drinking water in rivers or wells, reach the alimentary canals of other persons and produce the like disease in them."

His opinion that cholera was imported into the different districts of the Punjab is supported by few facts.

33. I cannot admit the accuracy of Dr. DeRenzy's statement when he asserts that in London the spread of cholera was demonstrated to have been dependent on *cholera-tainted* water, but it is not my purpose to enter into any general discussion regarding this or any other point connected with the disease. I shall merely consider how far the two decided opinions which he has advanced are supported by the history of the epidemic as it appeared in the Punjab in 1869. And first as to human intercourse. Neither as regards the city or jail of Umritsur is there any evidence of importation. "The prisoners had been carefully guarded by quarantine, and their employment outside the wall discontinued." The fact that six of the men who were attacked had been employed in making hempen string, suggested to the Sanitary Commissioner the probability of the virus being imported in the hemp, but "there was no clear evidence to show that the hemp came from infected persons." It is stated generally that the villages in the neighbourhood of Umritsur seemed to be liable to attack in the ratio of their proximity to, and facilities of communication with, the city. At Lahore "the first case occurred at the Railway station in a traveller just arrived from Umritsur, and the disease was for some time confined to the Sultan Serai or rest-house—a place where travellers from all parts put up—and in the Changer Mohulla." In none of the other districts, regarding which any particulars are given—Goordaspore, Jullundur, Goorgaon, Hissar, Sirsa, Rawul Pindee, and Peshawur, all of which suffered more or less from cholera—is there the smallest evidence to show that the disease had been imported, nor are even such general statements made as those above quoted which would lead to the suspicion that such had been the case. As regards Peshawur, it is certainly noted that there had been a brisk grain trade, and that, therefore, more than the usual intercourse with Umritsur had taken place, but such vague evidence is of little value.

Dr. Ince, who made a special enquiry into the epidemic in the Peshawur valley, does not conclude that cholera was chiefly spread by human agency.

34. Dr. Ince, who, under Dr. DeRenzy's direction, made special enquiry into the circumstances connected with the spread of the disease throughout the Peshawur valley, states that—"in 17 towns and villages out of the 829 which he inspected, the first cholera case was said to have been imported from a previously infected locality." "There is strong reason to conclude," he states,

"that, like the subtle poisons of small-pox and scarlet fever, cholera may be conveyed from place to place in the clothes or in the bodies of those who have been exposed to it;" but the general conclusions which he formed as the result of his enquiry do not seem to point to the belief that such human agency is the ordinary medium by which it is disseminated; for, immediately preceding the passage which I have just quoted, he writes—

"As to the cause of cholera, it is probably a specific poison, allied in its nature and origin to that of malarious fever. It is not known how it is generated, but the influence of heat and light and moisture, the presence of organic matter in process of decay, and especially the existence of some peculiar condition of the air, chemical, electrical or otherwise, are probably more or less essential to its production, and the nature of the soil, the proximity of sub-soil water, and the presence or absence of trees, may also have some influence on the process. When developed, it seems to pervade the air as an unseen smoke or vapour; but the usual results of moving troops and prisoners from their barracks would appear to indicate that its diffusion is limited, and it is also probable that it gravitates being most abundant in the lower strata of the atmosphere, or those nearest the surface of the ground. It also seems that it may be absorbed by water which, as is probably the case with marsh miasm, may thus become the medium of its propagation."

And immediately afterwards he adds—

"Some believe that the poison has the power of multiplying itself in the human body like the other recognized zymotic poisons, as those of measles and small-pox, and, therefore, that the disease may be communicated to others either by touching the patient, or by inhaling or imbibing the exhalations or excretions of his body. This opinion, however, is rendered doubtful by the rareness with which those attending cholera patients are affected; even in cases where they are attacked, it is equally probable that both patient and attendant were infected from a common source, either by breathing the same vitiated air, or drinking the same contaminated water. * * * During the epidemic at Peshawur there was a more or less universal feeling of *malaise* amongst the residents. Although not exactly ill, most people felt that there was something wrong; this was probably due to the intensity of the cholera poison which was then pervading the air."

The evidence throughout the Punjab generally does not favor the opinion that the disease was so spread.

35. I have quoted these passages at length, because the epidemic was very severe in the Peshawur valley, and this was the only portion of the Punjab in which, so far as I am aware, any special investigation was instituted into the history of the disease. The facts which Dr. Ince has recorded, and the conclusions which he has drawn from them, do not favor the opinion that the cholera was spread by human agency. The first statement appended to his special report shows that, out of 185 villages attacked, the date on which the first case appeared was in 126 of them between the 9th and 27th of September—the very time when the epidemic was most severe in the city and cantonment. The facts which have been recorded regarding the spread of cholera in the Punjab during 1869, certainly do not favor the idea that it was diffused by persons coming from infected localities. The disease was widely diffused throughout the province, in all 9,258 deaths were registered as having been due to it. If 50 per cent. of recoveries be accepted as the ordinary result, it follows that nearly 20,000 persons must have been attacked. Many hundreds of villages must have suffered, and yet the evidence of importation may be said to be almost *nil*. The difficulties of obtaining accurate data regarding Native communities are doubtless very great, and, as Dr. DeRenzy remarks, "failure to establish an affirmative does not prove a negative." But any opinion which does not rest on a solid basis of well ascertained facts is no better than a theory, and it cannot certainly be affirmed with reference to the recorded history of cholera throughout the Punjab in 1869, that human agency was indispensable for its diffusion.

The influence of human intercourse in spreading cholera requires much further investigation.

36. It will not, I trust, be imagined that, in making these remarks, I am arguing against the views of those who believe that human agency is the only or the chief means of spreading cholera. My object, as I have already stated, is merely to sift the evidence, and see how far it bears out the opinions which have been advanced. I am quite prepared to accept any conclusions which may hereafter be satisfactorily proved, but this is one of those important questions which requires very careful investigation before any answer can yet be given to it. Is human agency the great medium by which cholera is diffused over India? This is the point which has to be determined, and it is to be settled not by any mere theoretical considerations or foregone conclusions, but by a patient and painstaking investigation into the facts of every epidemic as it comes under observation.

There is no evidence to show that the violence of the epidemic at Umritsur was due to the use of water tainted with cholera discharges.

37. The water theory, as originally propounded by Dr. Snow, has attracted much attention and found many supporters in England. In Dr. DeRenzy's opinion it explains all the phenomena of the epidemic of 1869 in the Punjab, and it is, therefore, of great importance to test how far this opinion is really borne out by the evidence. The only places in the province which suffered with any great violence were, as has been already shown, Umritsur, Peshawur, and Kohat. Is there good reason to suppose that this violence was due to the fact that the water had been tainted with cholera discharges? The water at Umritsur is very impure, but there are no data regarding

the great epidemic in that city which substantiate the opinion that impure water was *the* one of the many insanitary conditions under which the people live which governed the violence of the disease. We have the two facts—an impure water-supply and a high death-rate from cholera,—but there is no reason to suppose that the one was the only, or even the chief, cause of the other. There is no reason to believe that the water of Umritsur is more impure than that of Native cities generally. The wells at Lahore, for example, are by no means pure; on the contrary, the Sanitary Commissioner states that "they are, as a rule, much exposed to pollution," and yet in Lahore, although the disease appeared, the mortality which it occasioned equalled only 2·48 per 1,000, whereas at Umritsur it was 22·71, or nearly ten times as great. If the inhabitants of one particular quarter of the town of Umritsur or those using any particular water-supply—and it is worthy of notice that there are no less than 1,025 wells within the city—had suffered first or more severely, there would be some ground for believing that the impurity of the one caused the epidemic violence of the other. But this is the very reverse of what occurred. The first authentic case was observed on the 27th May. "After the 27th May," writes the Sanitary Commissioner, "cases were of almost daily occurrence at Umritsur, but they were not numerous in any one place. * * * *

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* * The disease was confined to no particular quarter, but isolated cases occurred in all directions. * * From the 1st August the disease was universally diffused." But even if it be admitted that the violence of the outbreak at Umritsur was due to the impurity of the wells, it by no means follows that the result was caused by the presence in this water of any special virus derived from cholera evacuations.

The accuracy of the facts connected with the outbreak of cholera among the lunatics in the Lahore Asylum, as recorded by the Sanitary Commissioner, has been called in question.

38. Before considering the water theory in its application to Peshawur, some notice may be taken of the outbreak in the Lunatic Asylum at Lahore. Dr. DeRenzy explains its occurrence on the supposition that the sand which had been used for filtering the water drunk by the lunatics had been taken from a hole a few hundred yards from the Asylum in which he found human and other excrement. "According to the standing rules of the Asylum," he says, "the filtering sand is changed every Saturday. According to rule the sand would have been changed on Saturday, the 4th September. There is a strong probability that the sand taken from the hole already mentioned was that used on this occasion. The epidemic exploded next day at 4 P. M." Now, even if this statement be admitted as absolutely correct, it still falls very far short of proving that the outbreak was due to the use of water containing cholera discharges; but as a matter of fact the whole circumstances were carefully investigated by the Civil Surgeon and the visitors of the institution, and the conclusion at which they arrived was to the effect that the sand used for filtering on the day in question had not been taken from this hole; that, on the contrary, it was part of the very same supply which had been used for some time previous without any ill effects, and which continued to be used after the outbreak ceased. In their opinion there was no reason to suspect that the locality from which this sand had been taken had been defiled, nor was there any ground for concluding that the use of this sand has been in the smallest degree connected with the severe outbreak of cholera among the lunatics. I have no intention of judging which is the correct version of the story, but the objections which were made both by the Civil Surgeon and the visitors to Dr. DeRenzy's statement of the facts of the case ought to have been mentioned. It is of the utmost importance that every assertion on a matter of fact should be thoroughly tested before it is accepted as correct, and that any doubts which have been expressed, especially when they come from such competent authority as they did in this instance, should be recorded.

The facts of the Peshawur epidemic do not countenance the water theory.

39. The circumstances connected with the outbreak at Peshawur have been already fully discussed in my annual report for 1869, and no new facts have been recorded by Dr. DeRenzy which induce me in any degree to alter the opinions which are there expressed. The main water-supply of the city and cantonment, flowing as it does in an open channel, is peculiarly liable to pollution. Here again, as in the case of Umritsur, we have an impure water associated with a severe outburst of cholera, but there is no evidence to show that they stood in the relation of cause and effect. Indeed, there are certain facts which favor the opposite conclusion. The main water-supply, as I have just stated, is the small stream which runs through the cantonment, and which is very liable to defilement; but the water from Mackeson's well is of good quality, and from this was obtained what was required both for the Royal Artillery and the 104th Regiment. The 36th Regiment drank of the stream water, and yet they did not suffer more than the wing of the 104th, which remained in the cantonment after the other wing left and drank of the well water. Dr. DeRenzy attempts to meet this difficulty by saying that the troops, who were supposed to be supplied from the well, may really have obtained their water from the stream, for the water-carriers must naturally prefer to fill their *mussucks* in the easiest manner possible. When at Peshawur I made special enquiries on this point, and was assured on the best authority that the supply both for the Artillery and the 104th was very carefully taken from Mackeson's well. The water theory altogether fails to account for the facts—the escape of the left wing of the 104th Regiment which marched from the cantonment soon after the disease commenced, the continued suffering of the 36th Regiment long after it had ceased

to draw its water from the cantonment cutting, the extreme violence of the disease among the different bodies of troops whether in the cantonment or in camps, among the Native population of the cantonment and the city, and also I believe throughout the Peshawur valley generally on one and the same day—the 19th September. The immunity of the small garrison of the fort, Dr. DeRenzy attributes to the better quality of the water of the well from which their supply was drawn, and yet the water of this well is certainly no purer and no better defended than the water of the wells at many stations of which the troops drank and yet suffered severely.

Nor do those at Kohat, but the details are imperfect.

40. The facts regarding the epidemic at Kohat are very much of the same character. Here the water-supply runs in an open stream, and is very liable to pollution, and here also the people, both of the city and cantonment, suffered much.. The record of the outbreak is imperfect. In discussing the circumstances connected with it in my annual report, I was obliged to content myself with a short general statement which was supplied to me by Dr. Kelly, the Medical Officer of the 1st Cavalry. Without a full account of the several movements of the troops, and of the water-supply with which they were provided at their different encampments, it would be impossible to discuss the facts of this outbreak, which bear on the water theory with any degree of satisfaction. But here, again, even if it be admitted that the use of impure water was the main agent in spreading the disease, it still remains to be proved that this water acted in virtue of any cholera discharges which it contained.

At Peshawur different communities drawing their water from different sources all suffered severely.

41. The experience of London in the matter of cholera epidemics, which Dr. DeRenzy quotes as demonstrating the truth of the water theory, is chiefly valuable, because it showed that, in certain communities living with one exception under the same conditions, the violence of the disease appeared to be regulated by the quality of the water-supply—the one condition in which they differed. But no evidence of this nature has been adduced in India. There are innumerable instances of towns and cantonments suffering severely from cholera, of particular bodies of troops being attacked while all the others escaped, but no evidence has ever been adduced to connect the attack or the escape with the use of any particular water. Those who suffered and those who escaped frequently drew their supply from one and the same source. And the facts at Peshawur do not tally with the experience of London. The London experiment has, indeed, been repeated at Peshawur with a very different result. Here, also, we have different sections of the community living under similar conditions in every respect except the source from which they drew their water-supply, but there has been little difference in the extent to which they have suffered from cholera. It may be urged that, although the sources may have varied, they all agreed in being more or less impure; but even if this be admitted, it can hardly be conceived as possible that all of them should have been contaminated with cholera discharges, and that in such a way as to cause the greatest number of attacks in each of the communities who used them on or about one and the same day.

The geographical distribution of cholera cannot be explained on the water theory.

42. Nor can the geographical distribution of cholera in India be explained on the water theory. The water-supply of the people throughout the Punjab and the greater part of the North-Western Provinces is very much of the same character; it is drawn from wells which are all liable to pollution in very much the same way and to the same extent; and yet between Umritsur and Peshawur, a distance of several hundred miles, although cases were recorded from many of the districts between the month of May, when the first case appeared in Umritsur, and the month of September, when the outbreak commenced at Peshawur, with the exception of the case of the Lunatic Asylum at Lahore, we have no history of any special violence in any particular locality. In the North-Western Provinces, on the other hand, we have large tracts of country where the people suffered most serverely. Is it conceivable that in the one case it so happened that all the wells over a large area escaped the cholera pollution, while those in the other area were generally so contaminated? Again, is it reasonable to imagine that in one year the water over one area is polluted with cholera discharges, while in another year the pollution falls on a different portion of the country?.

The general facts of the epidemic in the Punjab do not support the water theory.

43. On a careful examination of all the facts, I cannot, therefore, admit that there is any evidence to prove that cholera-tainted water was the most influential of all the conditions which favored the propagation of cholera in the Punjab in 1869. Much more precise and positive proof must be adduced before this doctrine can be accepted as a truth. That good pure water is one of the next important requisites for health I fully admit, and, as I have frequently urged, there is no more pressing reform required in cantonments, cities, and villages than the provision of a really good water in ample quantity, of the best quality, and defended in every way from impurities; but the value of this reform can be insisted on just as forcibly and, indeed, with even greater justice, without attaching to it a theory which, so far as the facts regarding cholera in India are concerned, as yet rests on no basis whatever. Facts may hereafter be adduced to show that this water theory is more or less true; but, until such evidence is produced, the assertion that cholera is propagated mainly by cholera-tainted water remains unproved. This is one of the great questions to be investigated by the Sanitary Commissioners with the utmost care and attention; but such an investigation

can never be conducted with the hope of any satisfactory results, if it be assumed at the outset that certain theories regarding the disease have already been established as facts—that cholera cannot be diffused except by human agency; that cholera evacuations contain the special virus by which disease is spread, and that this virus acts on any community by gaining access to the water-supply. If the truth of these statements is believed by the enquirer to have been already demonstrated, very little remains for him to learn. But if, on the other hand, he enters on the study of an epidemic with his mind altogether unbiassed, he will find difficulties and anomalies innumerable which require the most patient and painstaking investigation.

The reasons which Dr. DeRenzy assigns for devoting a large part of the cholera section of his report to reviewing Dr. Bryden's work are based on a misapprehension.

44. Before leaving this section of DeRenzy's report, I must shortly advert to that large portion of it which is devoted to a review of Dr. Bryden's work on cholera. I have no intention of entering into this discussion; but the reasons which Dr. DeRenzy assigns as rendering it necessary for him to examine Dr. Bryden's views are founded entirely on a misapprehension, and therefore require some notice. "It is necessary for me," he writes, "to examine the propositions which express Dr. Bryden's theory in some detail, because (1) this officer's forecasts of the probable distribution of cholera and his views of its mode of dissemination have become the recognized basis of the action of the Government of India against cholera; (2) because the principles he maintains are diametrically opposed to those on which in my report for 1868 I urged the Punjab Government to proceed; and (3) because I consider his theory erroneous, and seriously calculated to retard sanitary progress." The first of these three statements is altogether incorrect and without the smallest foundation of fact. The action of the Government of India in regard to cholera has never, in the slightest degree, been influenced by any theoretical considerations whatever. In June 1869, the special occasions to which I presume Dr. DeRenzy refers, when cholera threatened to be general over Upper India, I recommended that, if the disease should appear at certain stations which had suffered severely in former years, the troops should be at once removed to places which had hitherto enjoyed a remarkable immunity from cholera, and arrangements were made to carry this suggestion into effect. Happily it was not required in the case of the stations selected, but the recommendation rested on no theory, but simply on the experience of a series of years. The rules to be observed on the appearance of cholera among European troops have been framed so that no precaution may be omitted which there is the smallest reason to believe may be adopted with advantage. They enunciate no theories, and yet the procedure they prescribe might have been recommended by the most enthusiastic believer in human intercourse and the water theory.

So is his statement that Dr. Bryden's views are calculated to retard sanitary progress.

45. With Dr. DeRenzy's second reason I have no concern, nor with the first portion of his third reason; but when he states that Dr. Bryden's theory is "calculated seriously to retard sanitary progress," he falls into a grave error. The progress of cholera over a given area, according to Dr. Bryden, is to a certain extent inevitable; but the degree in which the inhabitants of that area are likely to escape will depend greatly in their sanitary condition, on the purity of the water-supply, the excellence of the drainage, and the completeness of all other such arrangements. Dr. Bryden's object was not to write a work on sanitation, but to explain what he believes to be the laws which govern the spread of epidemic cholera over the country. The benefits of sanitary improvements were not insisted on, simply because this was not the point under discussion. But if Dr. Bryden's views should be substantiated, they will enforce the necessity of great sanitary improvements as the main means of escape, perhaps more strongly than any others which could be advocated; and such reforms would embrace not only the one item of a good water-supply, but every other requisite for health.

Such criticisms are calculated to do much harm, by converting the Sanitary Commissioners into partisans of some particular theory in place of being, as they should be, earnest and unbiassed observers of facts.

46. Dr. DeRenzy does but scant justice to Dr. Bryden's remarkable work, and it appears to me that, if such a proceeding as he had adopted is to be generally followed, it will lead to very inconvenient results. In any department it would be highly undesirable that one officer should dilate on and endeavour to expose what in his opinion are the fallacious doctrines of another, but in the investigation of such a difficult question as the causation of disease, and especially the causation of cholera, where our knowledge is at yet so far from exact, this course is especially to be deprecated. If the Sanitary Commissioners are to be engaged in reviewing each others reports, much of the benefit expected from their appointment will certainly be lost, and there is every reason to fear that what ought to be an altogether impartial investigation into facts will rapidly degenerate into controversy. In order that a Sanitary Commissioner may properly discharge the important duties assigned to him, it is of the first importance that he should keep his mind perfectly unbiassed by all theories. His great aim should be to collect facts, and *from these facts*, by a process of strictly logical induction, to draw what conclusions may be warranted by them, his judgment being altogether unfettered by the opinions which have been expressed even by the highest authorities. India presents a field for the study of cholera and other diseases such as can be found nowhere else, and the evidence which is year by year available in each province, if carefully collected, affords ample field for study. If a Sanitary Commissioner is to become the advocate of any particular theories, and the opponent of every other Sanitary Commissioner who differs from him, it is quite impossible that he

can preserve that thoroughly unbiassed and unprejudiced frame of mind which is so essential for the successful discharge of his duties; he will see only the facts which suit his own peculiar views, and insensibly shut his eyes to those which tell against them. Full and free discussion on sanitary matters is of great value, but this can be perfectly secured without introducing any element of controversy; and I would, therefore, strongly recommend that the Sanitary Commissioners should refrain from criticising the views which may be held by other officers in the same department.

The conclusions of the Sanitary Commissioner of Oudh are chiefly negative.

47. The Sanitary Commissioner of Oudh is of opinion that the history of the epidemic in that province has shed no light either on the nature, the origin, or the mode of the propagation of cholera. He is still inclined to the opinion that "there are two entirely distinct diseases known under the same name, one of which is of a spreading nature and the other is not," but this is one of those general statements which, in the absence of all proof, is of very little value. Dr. Sutherland states that "there has been no evidence of contaminated water being the means of conveyance of the disease, or of its germinating in the soil."

In the Central Provinces, Dr. Townsend believes that cholera was spread solely by human agency.

48. The most important conclusions at which Dr. Townsend has arrived, regarding the epidemic in the Central Provinces, may be learned from the following passages of his report:—"It is scarcely too much to say that the cholera which spread over the whole of the Central Provinces and the Bombay Presidency, and reached southward as far as Hyderabad in 1868-69, is traceable primarily to the cities of Mirzapore and Benares on the Ganges, and secondarily to the gangs of coolies on the road between Jubbulpore and Nagpore, and that human intercourse was the sole agent by which the spread of the disease was effected. The current in the main artery of communication between Eastern and Western India became polluted, and every region supplied by its ramifications became affected more or less according to its susceptibility. * * * * * * Every district in which enquiries were instituted furnishes evidence of importation by means of human intercourse, and in this as in my last report instances are everywhere given of the effect of fairs and other gatherings of people, and of the communication of the disease from village to village and from person to person." * * * * * * "Taking the facts that I have collected in this report and that of last year, I think it must be conceded that cholera spreads by the agency of human intercourse, and that it requires no other medium for its diffusion; that in other words it may fitly be placed in the category of contagious epidemic disease."

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In this report and in that for 1868 frequent instances have been given in which cholera was conveyed from one locality to another by persons not suffering from the disease, and there can be little doubt that during an epidemic this constantly happens.

Many instances have been given by him which appear to favor this view, but it is not supported by the general history of the epidemic.

49. These extracts show that Dr. Townsend is a firm believer in human agency as the great, if not the only, means concerned in the diffusion of cholera; and it must be admitted that, in his very careful enquiry, a very large number of instances are adduced in which the disease appears to have been communicated by persons either suffering themselves or coming from an infected locality. The general history of the epidemic, as described by Dr. Townsend in the following passage, does not, however, favor the idea that human intercourse was even the main medium by which the disease was spread:—"It may be said generally," he writes, "that the epidemic of 1869 had become diffused over the province by the end of March and beginning of April; that its prevalence increased rapidly in May, and reached its maximum early in June before the rains set in and then declined; from the beginning of July the decline was rapid, and continued with a slight interruption in the first part of August till October, when the epidemic finally died out. This description of the rise and decline of the epidemic over the whole province applies to the greater number of the different districts. These were, however, exceptions." That there was some general influence at work which produced these results, and which governed the rise and fall of the epidemic over a large area, cannot be doubted; but whether it was a miasm in the air or some other cause, regarding the nature of which we are as yet profoundly ignorant, has still to be determined.

Dr. Townsend believes that the one general influence which governed this history was the condition of the water-supply.

50. Dr. Townsend is of opinion that this one general influence is the condition of the water-supply, not the water theory in the same sense in which it was advanced by Dr. Snow and advocated by Dr. DeRenzy, but simply that the rise and fall of the disease are intimately associated with the impurity or purity of the water drank by the inhabitants. His remarks on this point are very interesting and well worthy of attention:—

"671. In the report on cholera that I submitted last year, I adduced a number of facts showing the intimate connection between impure water and the prevalence of cholera among the Native population, and the evidence of this report, of which the above diagram may be considered an epitome, particularly if read in connection with Table 14, showing the rise and fall of the water in the wells in different parts of the province, abundantly confirms the conclusion there drawn that drinking water fouled with organic impurities is the chief, if not the sole, condition under which cholera becomes epidemic in these provinces.

"672. The descriptions that have been given in the foregoing pages of the water-supply of the different districts, confirmed as they are by the drainage statistics given in Tables 13* and 14†, show that from the time that the rains cease in September till the rains of the next season commence, the water-supply of the country is continually diminishing and deteriorating; as the hot weather approaches, the current in the larger rivers slackens, and in the smaller streams ceases altogether, tanks more or less dry up, the water in the wells runs low in the second or third week of April, the hot and dry north-westerly winds set in, evaporation becomes exceedingly rapid, the diminution of the water-supply is greatly accelerated, and the insects and animalculæ that swarm in all sources of water-supply die and putrify. The extent to which this death of animal life in water takes place will, of course, depend on the volume of water and the conditions of stagnation and exposure to the action of sun and evaporation; but I believe it may safely be said that annually, in the hot weather between March and June, a very large proportion of the drinking water of the people of this province passes through a state of putrefaction. It is at this time that cholera is most rife, and it creates the greatest havoc in those districts in which water is most scanty and most exposed to the action of the sun and of evaporation—in Chattisgarh and Mundla, where the water-supply is derived from tanks or from stagnant nálás.

"673. Towards the end of May, the south-westerly winds and gathering clouds, which indicate the approach of the monsoon season, check the deterioration of the water-supply; cholera begins to decline, and, with the first showers of the rainy season, there is a considerable fall in its prevalence, but with the heavier rains, another cause by which the water-supply is rendered impure with animal matter, comes into play, and the tanks and wells become fouled by surface drainage. The operation of this cause is first evident in the district of Biláspúr, where, as I have shown, the tanks are most liable to pollution by surface drainage from the villages; a little later, when the rains have continued for some weeks, the surface water reaches the wells, and we find the prevalence of cholera increasing in the districts of Nágpúr plain, where the water-supply is largely derived from wells sunk in porous strata, and in which the rise of the water is most rapid; but even here the operation of this cause is most marked in the towns which have a wide area of polluted soil, and few villages are affected by it. The general decline of cholera throughout the country, though impeded by this cause, still continues, and eventually, when the sources of water-supply have been everywhere replenished and the rains cease, cholera dies out. * * * * *

"680. All these facts tend to show an intimate connection between cholera and water contaminated with animal organic matter. They do not, however, support the view that the water, under the use of which cholera is produced, is contaminated with the excreta of persons suffering from the disease; that it is simply the medium by which a specific poison contained in choleraic excreta is conveyed into the system. That choleraic dejections may contain specific poison is quite possible, but that the diffusion of the disease over a wide area depends upon this poison being communicated through the medium of the drinking water is most improbable. The evidence of the epidemic of 1869 in these provinces is totally opposed to this view; for the diffusion of cholera by this means sufficient rain-fall to wash surface impurities into the water is pre-supposed; but in these provinces a fall of rain in the hot weather that yields any surface drainage is a comparatively rare occurrence; and a reference to Table 12, which gives the rain-fall of the province in 1869, will show that during April and May, when the epidemic spread with the greatest violence, the mean rain-fall over the whole province did not exceed half an inch; and it is rather remarkable, too, that in the districts of Nimar, Chindwará, Chándá and Sironchá, where the rain-fall in May was rather above the average, cholera was least prevalent.

"681. While, therefore, I by no means deny the probability that the dejections of cholera patients contain the specific virus of cholera, I believe the instances in which the disease is communicated by water contaminated with this form of pollution to be comparatively rare. The connection between cholera and impure water is most commonly that of a predisposing cause; and there is reason to believe that any form of decomposing animal matter will create this predisposition; that water polluted by dead bodies thrown into it or buried near it, by the death of the animalculæ, or fish that swarm in nearly all sources of supply, or by the excrement of men or cattle conveyed into it by surface drainage, or percolation through a porous soil, will act as a virulent and fatal poison when the infection of cholera is present.

"682. I have given evidence, both in my last report and in this, that the inhabitants of a town or village may use water impregnated in an excessive degree with animal organic matter with apparent impunity as long as they are not exposed to the infection of cholera; but when this happens, when an infected individual arrives among them, the disease is manifested with violence in proportion to the degree of pollution of the water-supply."

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* Flow of water in Kanhan.

† Rise and fall of water in wells.

If this view be correct, then cholera should be epidemic every year.

51. Much, no doubt, depends on the water-supply; but if the circumstances described by Dr. Townsend are those which govern the rise and fall of cholera, or if, to use his own words, "drinking water, fouled with organic impurities, is the chief, if not the sole, condition under which cholera becomes epidemic in these provinces," it is difficult to understand why it is not epidemic in every year.

Dr. Townsend believes that this is prevented by all those who are susceptible having been already carried off.

52. In a succeeding paragraph Dr. Townsend, as if anticipating such an objection, propounds the theory that "the disappearance of cholera is due primarily not to the dying out of the choleraic influence or contagion, but to the absence of individuals susceptible to its effects," and that "a tract of country over which cholera has spread is for a time protected from a recurrence of the disease." But how is such a theory to be reconciled with the persistence of cholera within its endemic area, or how are the oft-recurring epidemics, which break out in districts bordering on this endemic area, to be explained? The question, although of theoretical interest, is of no practical importance, except in so far as it is connected with Dr. Townsend's opinions in relation to the impurity of the water being "the chief, if not the sole, condition under which cholera becomes epidemic." Without much further evidence, the theory could not be accepted. It is difficult to believe that when more than 100,000 persons, double the number who died of cholera in the Central Provinces in 1869, were found susceptible to the disease in one year, only 240, double the number who died in 1870, should be found susceptible in the year following, out of a population of over 6,000,000. Moreover, there is certainly no evidence to show that one attack of cholera confers any immunity from subsequent attacks; on the contrary, there is some reason to believe that those who once suffer are rather more liable to the disease than they were previously. But without insisting on this latter point, their remained 50,000 persons in the Central Provinces in 1870 who had recovered in 1869; there is no reason to doubt that they were susceptible to the disease, and yet in the whole province only 120 persons died of cholera in 1870.

In the history of the epidemic in the Central Provinces, there are several striking facts which support Dr. Bryden's views.

53. Dr. Townsend also has criticized Dr. Bryden's views in relation to the facts of the epidemic as it affected the Central Provinces. I have no intention of attempting to defend these views. At another time, with further experience, Dr. Bryden will, no doubt, be able to explain them still more fully, and to adduce fresh illustrations of the general truths which they contain, but I would observe that there are some points in Dr. Townsend's remarks which deserve notice. In the first place it is to be noted that, according to Dr. Bryden, the cholera of the Central Provinces in 1869 was not a new invasion, but a reproduction of the cholera of the previous year, and that, therefore, the meteorology, so far as regards the prevailing winds, does not affect the question. If the meteorology of 1868—the year in which the invasion took place—be considered, it may be argued that here also the prevailing winds did not favor the entrance of any miasm from the endemic province of the disease, but too much stress appears to have been laid on the question of the comparative prevalence of different winds. If cholera is an air-borne miasm, which is sown broadcast over a large area by means of wind, it is quite conceivable that it should be so sown with great rapidity.

It is to be remarked, moreover, that the wind which Dr. Bryden believes to have been the vehicle by means of which the Central Provinces were invaded by cholera in the spring of 1868 was a north-east wind—a wind, in fact, which would follow very much the same track as the highway from Mirzapore and Benares, along which, according to Dr. Townsend's belief, the disease was imported by human beings. A reference to page 154 of Dr. Bryden's general report, and especially to the footnote on that page,* shows that such north-easterly influences prevailed to an unusual degree at the time in question, and this phenomenon is easily accounted for by the signal failure of the south-west monsoon which characterized the year. I am not arguing in favor of the air-borne theory, but it is certainly not disproved by the fact that the winds in 1869 were not *generally* such as would bear up a miasm from the delta of the Ganges. Dr. Townsend's remarks on the extreme dryness of the atmosphere, which characterized the season when cholera prevailed in the Central Provinces, is a much more important point; but I must leave Dr. Bryden to consider the facts adduced by Dr. Townsend in connection with the views which he has advanced on the condition of the atmosphere most favorable to the spread of cholera. I would observe, however, that in Dr. Bryden's report on the cholera of 1869, he shows that the meteorology of the Central Provinces between the 9th and 15th May—the week in which the disease appears to have extended to the districts which had escaped in 1868—was characterized by the general diffusion of moisture as indicated either by actual rain or the presence of clouds.

It is also very remarkable that, during the severe epidemic at Raipore,—the only place in regard to which the daily register of the weather is given in full,—clouds were frequent, and there were also occasional showers. In commenting on the Table which shows the "meteorological conditions at Raipore during the epidemic," Dr. Townsend remarks (paragraph 513)—"It will be observed that the period of the epidemic was characterized by great heat and dryness of atmosphere; that during the week in which it reached its maximum, storms of wind from the south with electric disturbances and a few drops of rain were frequent. With the exception of the slight shower registered on the 21st May, and the few drops of rain that accompanied the electric disturbances in the following week, there had been no fall of rain since the middle of March, and none occurred till the 22nd of June. By that time the epidemic had ceased in the town, and was on the decline in the district." I observe, however, that, from the 10th of May, the date on which the register commences, up to the end of the month, although the mean humidity denotes great dryness of atmosphere, clouds were very frequent. In 18 out of these 22 days their presence is noted in a greater or lesser degree, and the same remark applies to 14 out of the first 21 days of June.

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* Since this was written Dr Townsend has pointed out that this refers to the Autumn months of 1868 and not to the Spring.—J. M. C.

The mode of enquiry adopted by Dr. Townsend is the best adopted for the purpose.

54. The sanitary report of the Central Provinces for 1869 is of much value, and opens up an almost endless field for discussion and attentive consideration in regard to cholera. The great questions connected with the disease still remain to be solved; but no better means could be adopted for accomplishing this important end than the special personal enquiry which Dr. Townsend instituted, and the record of which is contained in his report. He has also suggested that a still more searching investigation should be undertaken in certain selected portions of the Central Provinces, where, with the aid of a medical officer and of Native Doctors, the whole facts within a limited area may be examined and accurately recorded. This investigation has been proposed as a contribution towards the special enquiry recommended by the Army Sanitary Commission in the 5th Section of their instructions for conducting a cholera enquiry in India, and it will, I trust, soon be in operation.

The epidemic in Berar was supposed to be due to the use of pit-stored grain.

55. The epidemic of cholera in Berar is chiefly interesting from the fact that its violence was attributed to the use of old grain which, having been stored in pits for many years, was required under the pressure induced by the scanty crops of 1869. But a more careful investigation showed that this theory, which had been advanced by the Superintendent of the Revenue Survey, was incorrect. Although the pits in use in certain parts of the province had been drawn on to a large extent, the grain was not required for local consumption, and had been exported to other provinces where the demand was great. It, moreover, appeared that, in those parts of Berar where such pits exist, cholera had not been so prevalent as in others where they are not used, and, as a matter of fact, the particular part of the country regarding which the theory had been advanced suffered less than any other portion of the province. The pit-grain certainly could not be regarded as wholesome food, and was apparently well calculated to favor disease, especially of the digestive organs; but Dr. Lewis, to whom specimens were forwarded for examination, reported that, beyond having lost great part of its nutritive value, it did not present any peculiar features, nor did it develop any special organisms, such as might be associated with the occurrence of an epidemic.

Notwithstanding different theories, there is a general consent as to the value of sanitary improvements as the best preservative against cholera.

56. The discussion of the cholera of 1869, and of the various opinions which have been advanced by the several Sanitary Commissioners with regard to it, has occupied much space; but the epidemic was a most important feature in the sanitary history of a very unhealthy year, and it is of the greatest importance that all the facts connected with it should be carefully examined. It will be observed that I do not consider any of the opinions adopted by the Sanitary Commissioners as proved; some of them are purely theoretical, others require patient investigation and further proof; but it is satisfactory to know that these theoretical considerations do not materially affect the practical measures which seem best adapted to arrest the violence of any future epidemic. The strongest supporters of the doctrine that cholera is spread by human agency, or by human agency alone, such as Dr. DeRenzy and Dr. Townsend, fully admit the impossibility of adopting quarantine. All are persuaded of the value of a pure water-supply, and the argument in favor of this essential requisite of health is in no degree strengthened: indeed, it is rather weakened, by the theoretical assumption that cholera will attack any community with violence only when that water contains cholera discharges. The practical lesson of the epidemic is the same as that which has been taught by all former epidemics, general sanitary improvement, or, as Dr. Planck has well stated it, "the improved sanitation of the province generally, and especially of the principal centres of population."

SECTION II.—B.

Small-pox.—Its distribution and relative prevalence in the Lower Provinces are not recorded.

57. Cholera was not the only disease which was more than usually prevalent in 1869. Small-pox and fever, to all appearance the ordinary malarious fever of India, attained a very remarkable ascendancy and caused great mortality. With regard to each of these very wide-spread epidemics, I shall endeavour to summarize all the information that can be collected from the reports of the different provinces, but must premise that the history of both diseases is much less complete than it ought to be. Of the general distribution of small-pox over the Lower Provinces, nothing is known. It does not appear whether the disease was more or less prevalent than usual. At Dacca, there was an outbreak which began to prevail in September 1869, and lasted, it is reported, till the month of April 1870. The case is interesting chiefly on account of the special measures which were adopted to check the disease. Extra vaccinators were employed, a special small-pox hospital was established, and every precaution taken to arrest its spread. The great extension of the disease, which was to be feared in the spring, did not take place.

Outbreak at Dacca checked by special measures.

In the North-Western Provinces small-pox was more prevalent and fatal than cholera.

58. How widely small-pox was spread in the North-Western Provinces during 1869, and what a fertile source of mortality it was, may be judged of by the fact that while 69,542 deaths were registered from the great cholera epidemic of that year, the deaths attributed to small-pox numbered no less than 90,770. These figures are doubtless far from accurate. Deaths arising from measles and any other diseases associated with an eruption on the skin, are apt to be included by the people under the one general head of small-pox; but against this source of error, which is calculated to increase the number, it must be remembered, on the other hand, that very many deaths as yet escape registration altogether, and the probability is that the mortality from small-pox has been rather under-stated than placed at too high a figure.

The escape of Kumaon and Gurhwal, where vaccination had been general, bears striking testimony to the protective power of vaccination.

59. The information regarding this great epidemic is unfortunately very scanty. During the first five months of the year the disease was epidemic in many of the districts and prevalent in almost all. The fact that Kumaon and Gurhwal, with a population of nearly 650,000, escaped with only nine deaths, while in other districts the victims were numbered by thousands, is a striking testimony to the protective power of vaccination, and to the able exertions of Dr. Pearson who laboured so many years and with so much success to protect the people in these hilly tracts of country.

The monthly rise and fall of small-pox are illustrated by the statistics in a few districts.

60. The deaths from small-pox are not shown according to months except for four districts, but these statistics well illustrate the seasonal prevalence of the disease—the gradual rise from January to April, and then the gradual decline:—

1869.	DEATHS FROM SMALL-POX.			
MONTHS.	ALLYGURH.	AGRA.	CAWNPORE.	BANDA.
January	840	1,342	331	787
February	981	1,212	471	1,265
March	1,337	1,456	1,088	2,056
April	1,285	1,834	1,615	1,798
May	1,218	1,183	1,718	827
June	478	442	723	239
July	175	132	243	57
August	59	117	83	8
September	21	52	25	5
October	18	12	18	3
November	14	12	6	0
December	23	8	6	1
TOTAL ...	6,449	7,802	6,327	7,046

Dr. Planck's idea that the annual increase of small-pox every cold weather is due to the general practice of inoculation at that season is not consistent with the facts.

61. This rise and fall of small-pox, which is not confined to the North-Western Provinces, to any one section of the community, or to any particular year, is one of the most remarkable and unaccountable features of the disease which is of great interest, and the cause of which requires very careful investigation. Dr. Planck's theory on the subject is altogether unsupported by facts. "I am inclined to think," he writes, "the reason why deaths from small-pox always commence and increase in the cold weather months is that inoculation is practised then, and so the contagion of the disease is spread in every centre of population to end by becoming epidemic in some years in the hot months." It is a known fact that wherever inoculation is practised, there is a certain amount of risk of spreading the disease; but the opinion that the increase of small-pox over a whole province at a particular season of the year is really due to inoculation, would require some proof before it could be accepted as correct. Different districts must be compared, those in which inoculation is the practice and those where it is not known, and the results examined. As a matter of fact, I find from a summary of very interesting information on the subject of inoculation in different parts of India, which

attributed to over-irrigation. The practical remedies which he recommends are contained in the following paragraph :—

"344. I would, therefore, very earnestly counsel the gradual but certain establishment:

"(A.) Of such measures as may conduce to a lessened amount of canal irrigation—

"*1st.*—By discouraging the cultivation of rice wherever it was not cultivated before canal irrigation was introduced, and perhaps the best way of doing this would be to increase the land-tax of such land so long as rice is cultivated on it.

"*2nd.*—To introduce some method of distribution which shall require an increase to the manual labor now required to place the water so that it may spread itself over the fields.

"*3rd.*—To encourage a return to the ancient form of irrigation from wells in all places where the water in the wells now stands at less than 10 feet from the surface at any time of the year.

"B.—Of such measures as may improve the town and village sites—

"*1st.*—By raising them to the utmost possible extent, leveling and consolidating the surface.

"*2nd.*—By requiring a return to irrigation, from wells, of the land for a certain distance around every town and village.

"*3rd.*—By draining permanent water-holes to the nearest *nuddee*, the earth removed from the necessary cutting being utilized for the improvement of the town or village site.

4th.—By planting trees between any noted source of malaria and the town or village site.

By removing trees where they stand too thickly and serve no good purpose."

But districts of the Central Provinces and Punjab, where there is no canal, suffered more.

71. The question of irrigation, as a cause of malarious disease, is one of great importance, not only as regards those parts of the country where canals are already in operation, but also in connection with the great works of a similar nature which have lately been projected, and some of which have been already commenced. I do not mean to throw any doubt whatever on Dr. Planck's statement, that over-irrigation will make tracts of country previously healthy more subject to fever than they used to be; but such questions cannot be regarded from a merely local point of view. The prevalence of fever in 1869 was not confined to the North-Western Provinces. The Central Provinces and the Punjab, as we shall presently see, had a very heavy mortality from the same cause, and not a few of their districts, where no canal runs, and which are in ordinary years remarkable for the health of the inhabitants, suffered as much as either Mozuffernugger or Saharanpore. This will appear more clear from the following comparison. The district of Goordaspore in the Punjab, it is to be noted, has a canal running through, and it has been purposely introduced into the list, so that comparison may be made between the mortality from fever in it, as contrasted with the proportion of deaths from the same cause in other districts of the province which are not so situated :—

North-Western Provinces.			Central Provinces.			Punjab.		
Districts.	Population.	Deaths from Fever.	Districts.	Population.	Deaths from Fever.	Districts.	Population.	Deaths from Fever.
Saharanpore ..	866,483	11,189	Saugor ..	490,249	8,605	Goordaspore	906,126	21,824
Mozuffurnugger	682,189	10,541	Belaspore ...	530,541	10,060	Rawul Pindee	699,647	16,532
Banda ...	724,372	12,960	Raepore ...	586,118	9,894	Hoshyarpore	938,890	21,341
Bareilly ...	1,464,199	17,416	Jubbulpore	423,659	6,791	Umballa ...	1,008,952	13,875

The comparison is not altogether fair, because registration is, I believe, much less imperfect in the Central Provinces and Punjab than it is in the North-Western Provinces, and the proportion of deaths, which are not recorded at all in the North-Western Provinces, must be much greater than it is in these other portions of the country. But allowing for this source of error, it is evident that the violence of the fever epidemic was not confined to tracts which are traversed by canals. Hoshyarpore and Saugor suffered very much more than Saharanpore; Rawul Pindee and Belaspore very much more than Mozuffurnugger; and the comparison in other cases shows little results. The epidemic was remarkable not only because it was so widespread, but also because it attacked some places with greatest violence which are usually the most healthy.

The epidemic in the Punjab is not to be accounted for by the late and heavy rains.

72. In the Punjab fever contributed 272,946 deaths, or more than half the total mortality of the year. The death-rate from this one cause alone equalled 15·64 per 1,000. The proportion in different districts varied from a minimum of 6·17 to a maximum of 24·08. In the early part of August, in many of the districts, the epidemic commenced, in others it appeared in September, while others again did not suffer till October, or comparatively escaped. The loss of life in certain parts of the country, as in

Rawul Pindee, Hoshyarpore, and Goordaspore, was terrible, and the extreme prevalence of the disease prostrated the greater number of the inhabitants. The Civil Surgeons, who were consulted on the subject, were unanimously of opinion that it was due to "the late and heavy rains," assisted in some places by the weakly condition of the people caused by the high prices of food; but in my annual report for 1869, I pointed out that such an explanation does not meet the facts, and a similar opinion is, I find, expressed by Dr. DeRenzy. There can be no question that up to the month of August, when the epidemic was so severe in many places, the rain-fall had actually been less than in previous years when no fever prevailed.

There is no evidence to lead to the suspicion that the disease was other than malarious.

73. But while I coincide in the conclusion that the fever is not to be accounted for by the late and heavy rain, I cannot share Dr. DeRenzy's suspicion that it was not of a purely miasmatic origin, and that it may have been of the character either of that fever which, during the last ten or twelve years, has been recognized now and again in certain jails of the Upper Provinces under the name of Relapsing Fever, or Jail Fever, or Contagious Fever; or of the same character as the fever—whatever may have been its nature, and I do not offer any opinion on this point—which proved so fatal to the prisoners of the Rawul Pindee Jail in 1869. Of this there is no evidence. On the contrary, the statistics of European troops, of Native soldiers, and of prisoners within the area attacked, and the description of the disease as it came under observation in regimental and jail hospitals, show that it was of the same type as that ordinarily known as malarious fever. Dr. DeRenzy twice quotes Dr. Aitken's opinion that "agues have always been observed to be diseases of moist and marshy districts," and argues that because Rawul Pindee, which suffered so severely, stands on high ground and has excellent drainage, there is, therefore, good reason to believe that the disease was not malarious. But such an argument implies that our knowledge on the subject of malaria is already perfect, and yet any one who studies the statistics of communities occupying the same locality, and living to all appearance under similar conditions from year to year, must be struck with the fact that fevers which are very rare during one season, without any accountable cause become very prevalent in another. And it must, I think, be admitted that we are still very ignorant of the conditions under which the epidemic prevalence occurs, whether they be of atmosphere or soil, or be dependent on other circumstances. The epidemic prevalence of fever is just as inexplicable as the epidemic prevalence of cholera. It is quite impossible to believe that the fever epidemic of 1869, which was so destructive over so large a portion of the North-Western Provinces, the Central Provinces, and the Punjab, and which was at its height in all of them about the same time, could have been spread by human intercourse, especially when we have the positive evidence that the cases of the disease, which came under intelligent observation, could not be distinguished from the ordinary fevers which occur every season, and are known under the common name of malarious.

The immense number of cases of fever represented by the mortality is no argument against its having been malarious fever.

74. Dr. DeRenzy argues that if the great mortality which was occasioned by fever in certain districts of the Punjab had been due to the prevalence of the ordinary malarious disease, the number of cases must have been greater than can be readily believed. "Supposing the mortality from the disease," he says, "to be at the rate mentioned by Dr. Morehead (1·33 per cent. of attacks), it would have required upwards of 460,000 cases of fever to give the number of deaths that actually occurred in October alone in the Hoshyarpore District, the population being 938,890. In Rawul Pindee it would have required upwards of 330,000 cases, the population of the whole district being 699,647. Good medical treatment, no doubt, largely reduces the mortality from disease; but, on the assumption that the death-rate was even double that given by Dr. Morehead, the proportion of the population prostrated by fever must have been so large as to bring the business of the country to a stand-still." But, as a matter of fact, the business of the country was for a time seriously interrupted. The almost universal prevalence of fever among the Native population of the Peshawur valley, was assigned as one of the chief causes which prevented the earlier removal of the European troops from the cantonment when attacked by cholera. When I visited Rawul Pindee in November 1869, I found that I could not carry out my intention of going to Murree, because the Post Office cart had ceased running for the season, and the bearers were prostrated by fever. There had been difficulty in obtaining forage for the horses in cantonments, and agricultural operations, I was informed, had been seriously interfered with. It was said that at one time 80 per cent. of the whole population of the district were suffering from the epidemic. But more precise facts can be gathered from the statistics of European and Native troops at the same time. Dr. DeRenzy argues that if the deaths attributed to fever in the Hoshyarpore and Rawul Pindee Districts, had been due to malarious fever, one-half of the population in round numbers must have suffered from the disease in the month of October alone. At Mean Meer, in the month of October, among the Native soldiers, as a matter of fact, there were 869 admissions into hospital from fever out of a strength of 1,386, much more than one-half. Among the European troops, the admissions were 486 out of 922. At Rawul Pindee, in the same month, 700 Native soldiers gave 350 cases of fever, or just one-half. In the European corps the proportion was greater; at Peshawur, in the same month, out of 2,985 sepoys there were 1,611

admissions into hospital from fever. One of the most striking features of the epidemic was its extreme prevalence over certain areas. These figures certainly do not refer to different individuals. The same persons might be attacked with fever more than once even in one month, but it may be taken for granted that Dr. Morehead's statistics were framed on the same principle, and that his ratio of mortality was deduced from cases, not from separate persons.

The deaths in certain parts of Oudh from fever were very numerous.

75. In Oudh the deaths from fevers recorded were 87,795, or 7·8 per 1,000 of the population. From the general table in which these statistics are given, it seems that the disease was very prevalent in the districts of Oonao and Rae Bareilly, where the mortality under this head equalled 14· per 1,000; in others, such as Pertabghur and Seetapore, the loss was only 2 or 3 per 1,000. The distribution of the deaths by months is not given, nor is there any history of the disease.

In the Central Provinces there was a great epidemic of fever.

76. The Central Provinces show a mortality of 68,999 persons from fevers, or 39· per cent. of the whole mortality of the year. In his remarks on the epidemic, Dr. Townsend refers to the large element of error which is likely to arise under this head, to which I have already alluded, and doubts whether it is advisable to attempt to register the deaths from fever separately; but with all its imperfections, the information is still of great value. Dr. Townsend is of opinion that the fever of the hot season may, in great measure, be due to impurity of water, while the extent to which the fever of the autumn months shall prevail depends on the rain.

"If the rain-fall has been abundant, and, more especially, if it has been continued late in September and October, the development of malaria will be great and *vice versa*. The seasons of 1868 and 1869 afford marked evidence on this point. In 1868 the average rain-fall of the monsoon over the whole province was 15 inches below the average, and the deficiency was greatest in the months of September and October. The morning dews that usually prevail in the autumn months were light and soon ceased, the water in the wells was very little increased, and the sub-soil water remained at a considerable depth from the surface. Under these circumstances the development of malaria was unusually slight, and had comparatively little effect on the returns of mortality from fever. On the other hand, in 1869, the rain-fall of the monsoon was abundant, and, more particularly, the fall in September and October was more than double the average, and three times what it was in 1868, and the returns of the autumn months show a marked increase in the mortality from fever over the corresponding period of the previous year. This increased mortality, however, was not altogether due to the greater prevalence of malaria, for the malaria of these provinces is not, under ordinary circumstances, directly fatal to life; but in 1869, in many districts, a large portion of the population had been suffering from insufficiency of food from the commencement of the year, and many who had been able to drag through the hot weather succumbed under the climatic changes produced by the monsoon, and were carried off by attacks of fever which, under better circumstances, they would have been able to withstand."

The increased rain-fall, especially in the latter months of the year as we have already seen, does not solve the unusual occurrence of fever in the Punjab, and without a more detailed statement, it is difficult to judge how far the two were connected in the Central Provinces. A comparison of the monthly rain-fall in each district in 1869 with that of 1868 is required, as well as a statement of the monthly deaths from fever in similar detail. As Dr. Townsend observes, the conditions which favor the development of malaria form a very difficult subject of study, and the special attention which he proposes to devote to it will, I doubt not, elicit some interesting particulars.

In the Madras Presidency fever was severe, and it prevailed most in the non-irrigated districts.

77. In the Madras Presidency 132,346 deaths were attributed to fever, or a ratio of 5·3 per 1,000—a proportion very nearly equal to one-third of the whole mortality. The remarks of Dr. Cornish, the Sanitary Commissioner, on the epidemic are of much interest, especially in connection with the question of the influence of canal irrigation in favoring the prevalence of the disease, to which allusion has been already made.

"The year 1869," he observes, "has been remarkable for a considerable increase in the fever mortality of the population of the Madras Presidency.

"Fever has been specially fatal in the districts of Godavery, Kurnool, Vizagapatam, Cuddapah, Ganjam, Malabar, and South Canara. The small population on the Neilgherry Hills, too, has suffered unduly.

"The highest mortality of all has occurred in the Godavery District (12·0 per mile), where a large tract of country is under canal irrigation. If a similar mortality had occurred in the adjoining irrigation district (Kistna), or in the delta of the Cauvery (Trichinopoly and Tanjore), where irrigation has been practised for many years, it would have become a question whether some connection might not have been traced between the accession of fever and the influence of canal irrigation; but, as a matter of fact, fever has been more prevalent and fatal in the districts of Bellary, Kurnool, and Cuddapah for the past four years, where there are no irrigation works to speak of, than in the Godavery District for the same time; while the irrigated districts of Kistna, Tanjore, and Trichinopoly have had a fever mortality of *fifty per cent.* below that of the dry districts just mentioned.

"The fluctuations in fever mortality in the several districts deserve to be carefully studied from year to year. So far as the figures of the four years enable one to come to any conclusion, the causes producing fever would appear to be operative over widely extended tracts of country at the same time, and to be in action for long periods together. It is noticeable that a high fever rate in Ganjam and Godavery has been co-existent with a similar high fever range in Lower Bengal, in Kurnool, and South Canara, places which are very wide apart."

No statistics are given to show the deaths from fevers in the Bombay Presidency.

78. The statistics of the Bombay Presidency do not afford any information on the subject of fevers. The deaths due to this disease are not separately entered, nor are any remarks made on this cause of mortality by the Sanitary Commissioner.

SECTION II.—D.
Bowel complaints and injuries are not generally commented on by the Sanitary Commissioners.

79. Bowel complaints and the various kinds of injuries as causes of mortality do not require special notice; for, although they are separately entered in some of the annual statements furnished by the Sanitary Commissioners, they do not find place in all of them, and, as a rule, no comments are made with regard to them. With the general introduction of the new forms, this want of information will be supplied, and the interesting facts, which may be elicited under these several heads, will, no doubt, invite attention.

SECTION III.
The *meteorology of the year* was remarkable.

80. This sketch of the history of the diseases, which chiefly contributed to the mortality of the different provinces, rapid and imperfect as it has been, has occupied so much space that I must content myself with a very brief notice of the matters which remain to be discussed. The main facts regarding the meteorology of the year have been already recorded in my annual report for 1869, but they may be very briefly recapitulated here for the purpose of ready reference in connection with the general history of disease. In the Lower Provinces, Mr. Blanford shows that—"the most striking feature of the temperature of 1869, as compared with that of 1868, is the high range in the first five months of the year" . . . . "the fall of rain was less than the average in Orissa, the Gangetic Delta, and Arracan, also in Eastern Bengal except Sylhet, and *probably* Chera Poonjee in Lower Assam, Sikkim, and parts of Behar. It was above the average at Sooree and Berhampore and over a tract of country stretching between the Rajmehal Hills and the Bhootan Dooars, including Dinagepore, Rungpore, and probably Julpigoree and Buxa. The rain-fall in Upper Assam seems also to have been in excess of the average, and it certainly was so in Sylhet." The meteorology of the North-Western Provinces is not discussed separately, nor are any statements of temperature, rain-fall, &c., given for the province; but allusion is made here and there to the peculiar characters of the year. "The remarkable features as regards climate were a lengthened hot season, a dry ardent season, commencing early and extending far into what is usually counted as the rainy season: a delayed rainy season characterized by a rain-fall of more than average quantity, and ending in quite a flood of rain as late as the first ten days of October." No separate section of the Punjab report is devoted to meteorology, but a summary of observations in the Punjab by Dr. Neil, the Meteorological Reporter of the Province, is given as an appendix. There was the same general history here as in the North-Western Provinces—a high and protracted temperature during the first five months of the year, and a heavy rain-fall distributed over a comparatively short period. In the report for Oudh no mention is made of meteorology; but the subject has received much attention in the Central Provinces, where observations are recorded in a certain number of stations under the superintendence of the Sanitary Commissioner. The general results for 1869, as compared with those for 1868, are thus stated by Dr. Townsend :—

"The mean barometric pressure was greater in January, February, April, August, and November, less in the other months.

"The mean temperature was considerably higher in the first half of the year, *i. e.*, in the spring and hot weather; lower in the rainy season and autumn.

"The mean humidity was less in the first half of the year; considerably in excess during and after the rains. There was less cloud in May, the hottest month of the year. In the autumn the amount of cloud was greatly in excess over the season of 1868. This is a rather important point with reference to the relative prevalence of blight in the corresponding seasons of the two years.

"The rain-fall was less in the spring and hot weather; greater during the monsoon, and this was more especially the case in the months of September and October.

"In the general direction of the wind, there was no great difference in the two years. South and south-westerly winds were to a slight extent more prevalent in 1869 in March and in September. The velocity of the wind was much the same during the hot weather in both years; it was considerably less in the rainy season; greater in October.

"The amount of ozone, as estimated by Schonbein's test, was generally less than in the preceding year, but greater in June, October, and November."

SECTION IV.

The food supply of the people.—This important subject has been discussed in a separate section only by the Sanitary Commissioner of the Central Provinces.

81. Dr. Townsend is the only one of the Sanitary Commissioners who has devoted a special section to the consideration of the food-supply of the people, and the information which it contains is not only full of interest, but has a very important bearing on the sanitary history of the year. In the other annual reports, the subject does not receive the attention which it deserves; in some it is passed by altogether, in others only incidental mention is made of it; and yet there can be very little doubt that the famine in 1869, the effects of which were felt far beyond the area in which the crops had failed, had no small influence in favouring the spread of the great sickness of the year, and in determining the excessive mortality which it occasioned.

SECTION V.

The record of *personal proceedings of the Sanitary Commissioners* is generally defective.

82. On hundred and one different places in the Lower Provinces were visited by the Sanitary Commissioner during the year. Dr. Smith mentions that he travelled 2,500 miles in the course of these inspections, and was absent from the Presidency on tour for nearly nine months out of the year. Great part of Dr. Planck's report is occupied with a description of 35 towns and cities which he inspected. The Sanitary Commissioners for the Punjab and Oudh append to their reports remarks made on the sanitary condition of certain towns which they visited, but there is no general record of any inspection tour. In the Central Provinces, although the movements of the Sanitary Commissioner are not detailed, Dr. Townsend visited a large portion of the country, and minutely examined the circumstances attendant on the unusual prevalence of disease.

SECTION VI.

Sanitary Progress.—This subject has not been generally discussed in the reports.

83. Excepting in the Punjab report in which Dr. DeRenzy has devoted a special section to "the Progress of Sanitary Improvement," the important question of what sanitary measures were either suggested or effected during the year has not received from the Sanitary Commissioners generally that prominent notice which it merits. The orders of the Government directing special attention to this subject had not reached them when their reports for 1869 were prepared. In future years full details will doubtless be given.

Dr. DeRenzy's remarks on venereal diseases among European troops greatly under-estimate its importance as a cause of inefficiency among them.

84. Before concluding my review, I must refer to certain remarks on the subject of venereal disease and the measures which have been undertaken with a view to its prevention, which have been made by the Sanitary Commissioner of the Punjab in a letter, copy of which forms one of the appendices of his report. Referring to the opinion of the Sanitary Commission of Bengal, as expressed in their annual report for 1864, an opinion on which all the rules and regulations for the prevention of venereal disease have been based, Dr. DeRenzy states that, in his belief, the evils attributed to this cause have been greatly exaggerated, that the means adopted to check them have failed, and that all measures intended to accomplish this object will meet with a like result. The point referred to the Sanitary Commissioner by the Government of the Punjab appears to have been not the advisability of attempting to protect European soldiers from this disease, for that question has already been fully discussed, and the necessity for such preventive measures had forced itself on the attention of the Government, but simply how the measures which had been already in operation within the cantonments could best be extended to such of the neighbouring civil population, from among whom the soldiers were believed to contract the disease; how, in fact, the Sanitary Commissioner could best discharge one of the important duties which were originally assigned to him. Dr. DeRenzy has, however, discussed the question of the advisability of attempting any such protection at all, and his statements, which very imperfectly represent the facts, have, I understand, been claimed by the opponents of the Contagious Diseases Act in England as arguments why this Act should be abolished. In their report for 1864, which has been already referred to, the Sanitary Commission for Bengal quoted the opinion of Dr. Duncan Macpherson, to the effect that "fully two-thirds of those who imbibe the disease are invalided within five years, and are sent out of the service with a loathsome poison circulating in their veins which passes down to their posterity." Taking the figures from Dr. Bryden's table, Dr. DeRenzy states that in the five years, 1864-1868, there were 36,879 admissions from venereal disease, and that the total number of men invalided on account of syphilis in the same period was 509. "According to Dr. Macpherson's estimate," adds Dr. DeRenzy, "the number would have been 24,586, supposing that each admission represented a distinct individual point on which I shall remark on hereafter." But in using this argument, Dr. DeRenzy must have been aware, and indeed the sequel shows that he was perfectly aware, of the fact that the admissions do not and were never intended to represent distinct individuals. The proportion of admissions into hospital from any disease among every 1,000 men is a recognized and well understood standard of health statistics. It means simply that so many cases of illness occurred, it never professed to mean separate individuals, nor could such a meaning ever be properly attached to it. In one place Dr. DeRenzy quotes these admissions as if they represented separate individuals; in another place he insists on the

well-known fact that the same man may be the subject of several attacks during the year, and so swell the number of cases. So far as I know, venereal disease was never pointed to as one of the great causes of mortality in the European army in India, so Dr. DeRenzy's arguments in controversion of an assertion which appears never to have been made do not require notice. It is impossible to adduce any statistics to show how much of the annual invaliding is due to venereal affections, or how far the constitution of soldiers' offspring is impaired by the syphilitic taint of the parent. No statistics could supply this information, but any one acquainted with the British soldiers knows how frequently that deterioration of health which leads to death, or discharge from the service, is traceable to the syphilitic poison. There is, however, one point in regard to which we have statistics, and that is the degree of inefficiency among European troops, which is directly due to venereal disease. In my annual report for 1868 I gave a table prepared by Dr. Bryden to show the amount of inefficiency caused by the chief diseases in each month of that year, and any one who doubts the prominent place which venereal affections hold in the returns of British Military Hospitals can refer to that table and judge of the results. It is shown there that the average number daily inefficient from this class of diseases was greater than that from any other cause whatever. The general totals for the year are as follows :—

DISEASES.	Average daily number inefficient from each disease.	Average daily inefficiency per cent. of strength.
Fevers ...	311	·99
Dysentery and Diarrhœa	98	·31
Hepatitis ...	89	·28
Respiratory Diseases	92	·29
Venereal Affections	365	1.16
All other causes	635	2.01
TOTAL	1,590	5.04

And this return takes no account of the many cases of illness which were due indirectly to venereal disease. In 1869, out of a total average daily sick list of 1,985 during the year, 436 of the cases were due directly to venereal. In 1870, out of a daily average total of 2,017 men in hospital, the inefficiency was due in 430 of them to venereal. I do not under-estimate the value and importance of sanitary measures for checking cholera, fever, and other diseases; but such measures will have no effect in diminishing the prevalence of that special class of diseases to which reference is now made. There may be differences of opinion on moral grounds as to the desirability of having any measures for checking venereal disease, there may reasonably be differences of opinion as to the best measures to be adopted for its prevention, but it seems hardly credible that any one acquainted with the facts should argue that this class of diseases is comparatively of so small importance that no means need be taken for its prevention at all. The returns for 1870 are not yet complete, nor have all the reports of the Lock Hospitals for that year been received. Judging from the statistics of previous years, during which the regulations for the prevention of venereal disease in military cantonments have been in force, I fully admit that the results have been most unsatisfactory, and that the amount of good which has been done was by no means so great as was to be expected; but these unsatisfactory results are due not to any defects in the system, but to the very imperfect manner in which the system has been worked. Wherever the civil and military authorities have energetically combined to give it a fair trial, the results have been very different.

The work which has been already done by the Sanitary Commissioners is of the greatest value.

85. The work of the Sanitary Commissioners, as a whole, so far as it is evidenced in their reports, gives much ground for satisfaction. Their duties may be stated broadly to consist of two great divisions—*1st*, to obtain information regarding the sanitary condition of the people, the geographical distribution of disease, the nature and history of epidemics, the circumstances favorable to their spread, and the many other matters connected with the health of the population; and *2nd*, to point out and urge the importance of the various sanitary measures which are needed. Under the first of these heads much has been done; the history of epidemic disease throughout India in 1869, imperfect as it is, presents a striking contrast to the absence of all information which attaches to former years. The data, the collection of which has been so well begun, will gradually improve and soon form the basis for most valuable generalizations. Knowledge of disease and of the circumstances under which it breaks out in violence must form the foundation of all progress, and in this view of the case what has been effected represents progress itself. Under the second head not much has been shown; but that arises in some measure from the fact that the Sanitary Commissioners have not specially discussed the question. No great sanitary engineering works, so far as I am aware, have been inaugurated during the year; but it would be wrong to estimate progress merely by such great improvements which can be executed only at the cost of much money and by special engineering skill. It will be some time before such works can really be

done on any large scale, but mean time there is ample field for sanitary improvements in the towns and villages, where much that is required can be done at little expense. The first step in sanitary reform is to teach the people its value, for without their assistance it is useless to expect any satisfactory results. If the suggestions which I have lately made for placing the health department on a wider and more efficient basis be approved, I believe that an important step will be taken towards this important end.

The several recommendations which have been made in this review are here recapitulated.

86. In concluding this review, the great length of which has in great measure been due to the very unhealthy character of the year to which it refers, I shall, for the sake of convenience, briefly recapitulate the various recommendations and suggestions which have been made in the course of it; and, as these may be conveniently considered in relation to one or other of the sections which I have adopted, I shall take the opportunity of showing clearly what these sections are, in the hope that the Sanitary Commissioners will follow the same arrangement. In preparing this review, I have been more than ever struck with the importance of having these reports prepared on one uniform plan, not only because it will prove a great convenience to myself, but also because it will be a great convenience to the various Sanitary Commissioners in studying each other's work, and to the public generally who may be interested in sanitary matters, and who may be anxious to compare the data contained in one with those which are to be found on the same subject in the others.

Suggestions for the preparation of Sanitary Reports on a uniform plan are here detailed.

87. Each sanitary report should, therefore, consist of six distinct sections, and under each of them the various points now to be detailed should receive prominent notice.

I.—The vital statistics of the province.

The annual statements should be according to the standard, from which no deviation whatever should be made. If the population to whom registration has been extended does not embrace the whole population of the province, the fact should be mentioned in a foot-note, and any discrepancy in the numbers of the whole province, or of any district, as compared with those of the year previous, should be explained.

The figures should be punctuated by millions and not by lakhs.

Any statistics regarding births and marriages should be shown in separate statements from the mortuary tables.

Any measures for improving the registration which have been adopted during the year should be noted, and how far any improvement has been effected.

II.—History of the chief diseases during the year—

(*a*.)—Cholera.
(*b*.)—Small-pox.
(*c*.)—Fevers.
(*d*.)—Bowel complaints.
(*e*.)—Injuries.

With regard to each of them, the facts should first be recorded, and then the opinions, if any, which have been based on them,

III.—The meteorology of the year.

The main features of the year should be shortly noted, and any connection which they appear to have had with its sanitary history discussed. The monthly rain-fall and temperature in particular should be compared with the monthly statistics of disease in each district, from which such data can be procured. The daily rain-fall and daily register of other meteorological phenomena in connection with the prevalence of epidemics are of much importance.

IV.—The food supply of the people, as effected by the out-turn of the crops, the rate of wages and the prices of grain, and such information should, as far as possible, be given for separate districts, in relation to the comparative mortality in each.

V.—A record of personal proceedings.

This should include a note of the various places visited during the year, although the special reports on each need not always be printed. The dates of such inspections should always be given for future reference. In connection with this point, I would observe that those tracts of country should generally be selected for inspection which have suffered from any unusual sickness in the preceding season, and an attempt should be made to investigate its causes on the spot.

It may be urged that the Sanitary Commissioners are too much occupied with the supervision of registration to be able to leave their head-quarters for any length of time, but they can do much more to secure efficient registration by moving about the country than by any other means. They can interest district officers and others concerned in the work, and can satisfy themselves as to the manner in which the registers are kept. The mere prospect of their visit will stir up the registrars to greater attention; and with all this advantage gained, they can also do much to become acquainted with the country and with the people, and to enlighten them in the benefits of sanitary reforms. The details of compilation must be done by the office establishment, and the results checked here and there.

Under this head also mention may be made of any special reports which have been submitted during the year.

VI.—Sanitary Progress.

This should be a record of any progress that has been made in the year, not only as regards the projection or execution of any great engineering works, but also, as it concerns reforms of a minor nature,—any means taken to instruct the people in their value and any sign that advance has been made in this direction.

And in offering their remarks and opinions on these different heads, and on any other matters which deserve notice, the Sanitary Commissioners should abstain from criticizing the views of other officers in the same department. The fullest and freest discussion may be carried on with regard to any theoretical opinions, and the facts of the year may be considered in the light of these opinions without imparting to the discussion anything of a controversial nature, and without endeavouring to show that the views advanced by any other Sanitary Commissioner are erroneous or calculated to do mischief.

The reports should be submitted at a much earlier date than heretofore.

Each report should be provided with a complete table of contents, and with a clear map of the province in which the geographical distribution of cholera and its relative fatality in different places should be distinctly shown.

Dr. Goodeve's plan of a map for showing the distribution and prevalence of cholera requires modification.

88. I believe, however, that the idea of furnishing such a map after the manner suggested by Dr. Goodeve, and ordered by the Secretary of State, must be abandoned as impracticable. The provinces are too large to be dealt with in this way, and every map which has been attempted on this system has been more or less a failure. The main object is to show at a glance the chief facts of the epidemic, but the innumerable circles and figures which are required to illustrate the history of an epidemic among the general population would lead to the greatest confusion. It is very desirable that the same method of indicating the results should be adopted in all parts of India, and that this method should be as complete as can be desired. I propose, therefore, to consult all the Sanitary Commissioners on the subject, and then to submit an improved design of map for the consideration and orders of the Government.

APPENDIX B.

A

REPORT ON CHOLERA,

BY

D. DOUGLAS CUNNINGHAM, M.B., EDIN.,

ASSISTANT SURGEON, HER MAJESTY'S INDIAN ARMY,

ATTACHED TO THE SANITARY COMMISSIONER WITH THE GOVERNMENT OF INDIA.

CONTENTS.

PART I.

PETTENKOFER'S THEORY ILLUSTRATED IN MADRAS.

Para.

Impossibility of deciding definitely regarding the validity of the soil theory at the present time 1
Certain facts may indicate validity or fallacy of objections to it 2
Correctness of the facts on which Pettenkofer found the theory undoubted 3
Dr. Buchanan's interpretation of these facts 4
Objections due to misunderstanding 5
Misapprehension regarding the nature of the observations which are necessary to furnish valuable data 6
A class of wells which appear to be incapable of affording exact data 7
Characters in observations rendering them of value 8
Facts in connection with the soil theory observed in the Madras Presidency and Mysore 9
Madras.—Nature of the soil in Madras compatible with liability 10
Important bearing of the stations of Palaveram and St. Thomas Mount on the soil theory 11
Palaveram.—Nature of the soil, water-supply, &c. 12
Reputation for immunity, &c. 13
Difficulties in explaining the occurrence of cholera in 1869 14
Reasons for liability of a village in the station 15
St. Thomas Mount.—Character of the soil, &c. 16
Points to be noted in connection with the soil theory 17
Dr. Balfour's statistics of relative liabilities of bodies of troops stationed at St. Thomas Mount 18
The Neilgherries.—The relative immunity of the plateau 19
Nature of the soil 20
The explanation of the relative immunity afforded by the soil theory not the only tenable one 21
Immunity to be ascribed to some physical condition or conditions 22
Salem.—Nature of the soil, &c. 23
Fluctuations in amount of soil-moisture great 24
Facts regarding cholera 25
The locality furnishes special facilities for the local development of cholera according to the soil theory 26
Cholera of 1870-71 27
Incompatibility of the cholera phenomena of Salem with a purely water theory 28
Absence of data for comparison 29
The Shervaroy Hills 30
Nature of the soil 31
Streams and wells 32
Entire failure of any contagionist explanation of the immunity of the Shervaroys, &c. 33
The soil theory meets the requirements of the case better 34
The Mysore Country 35
Situation of villages, tanks, &c. 36
Important influence of tanks on soil conditions 37
Level of water in wells 38
Is cholera endemic in the Mysore country? 39
In such a tract as Mysore there should be exempt localities 40
Universal contemporaneous liability cannot be expected 41
Mysore an excellent field for observation on the soil theory 42
Localities visited 43
Bangalore 44
Nature of the soil 45
Frequency of cholera in Bangalore 46
Existence of localities furnishing conditions apparently unfavorable to local development of cholera according to the soil theory 47
Bearing of the chief cholera-facts of this station on the soil theory 48
Toomcoor, Cora, and villages reputedly exempt 49
Situation of Toomcoor 50
Water-levels of wells 51
Dietary of inhabitants 52
Cholera-facts of Toomcoor 53
Coincidence of cholera with soil moisture 54
General conclusions 55
Cora.—Situation, &c. 56

Para.
Sanitary condition. Population ... 57
Wells and their water-levels ... 58
Absence of data regarding the season of occurrence of cholera ... 59
Reputedly exempt villages ... 60
TIMMARAJANAHULLY... 61
Nature of the soil ... 62
Water-supply ... 63
Soil conditions such as should favor immunity ... 64
LINGANHULLY ... 65
Water-supply ... 66
Water liable to all the evils of exposure and concentration ... 67
TAPPAD BEGOOR.—Situation ... 68
Nature of the soil ... 69
Number of houses and inhabitants ... 70
Evidence regarding immunity ... 71
CLOSPETT.—Situation ... 72
Nature of the ground occupied by the town ... 73
Wells and their water-levels ... 74
Water-supply ... 75
Number of inhabitants. Dietary... 76
Data regarding the localization of cholera are unattainable ... 77
Liability of Clospett accordant with the soil theory ... 78
MYSORE.—Situation ... 79
Nature of the soil ... 80
Wells and water-supply ... 81
Dietary of inhabitants ... 82
Cholera, a disease of showery weather ... 83
Reputed exemption of a pagoda village on Charmandi Hill ... 84
This reputation as regards local development only ... 85
TANJORE.—Situation... 86
Irrigation of the district ... 87
Soil moisture mainly dependent on the river ... 88
According to the soil theory there ought to be two periods of special liability to cholera ... 89
Cholera of moist regions in dry season, of dry regions in moist season ... 90
Soil conditions of the town of Tanjore, wells, &c. ... 91
Wells at Vallam ... 92
Water-supply of Tanjore ... 93
Tanjore on a laterite soil and specially prone to cholera ... 94
The chief cholera-facts accordant with the soil theory ... 95
TRICHINOPOLY.—Situation ... 96
Tanks, wells, and their water-levels ... 97
Cantonment ... 98
Water-supply ... 99
District and central jails ... 100
Sreerungum ... 101
Cholera season ... 102
Soil conditions in Trichinopoly less uniform than in Tanjore ... 103
One suburb of the town is specially liable ... 104
Physical conditions of this favorable to the development of cholera ... 105
The rock fort ... 106
Cases of cholera must show distinct evidence of local development in order to be of weight against the soil theory ... 107
Facts regarding the jails ... 108
Special liability of Sreerungum perfectly accordant with the soil theory ... 109
Cholera in 1870-71 ... 110
THE CEDED DISTRICTS ... 111
Characters of soil ... 112
Red and black soils differently affected by moisture ... 113
Rainfall ... 114
Cholera ought to be a disease of the moist season ... 115
Facts accord with the assumptions of the soil theory ... 116
BELLARY.—Situation... 117
Large tank ... 118
Situation of barracks and bazaars... 119
Nature of the soil ... 120
Wells and water-supply ... 121
Facts regarding cholera ... 122
Special liability of the bazaars accordant with the soil theory ... 123
Concentration of water-supply with slight development of cholera ... 124
Facts of 1869 in reference to the water theory ... 125
GOOTY.—Situation ... 126
Nature of the soil ... 127
Rain and cholera ... 128
Dietary of inhabitants ... 129
Cholera of 1869 ... 130
Soil conditions should induce variations in the season of liability of different places ... 131
COTTAPULLY.—Situation ... 132
Nature of the soil ... 133
Village crowded and dirty ... 134
Water-supply ... 135
Cultivated ground ... 136
Facts regarding the outbreak of cholera ... 137
Five times as many cases as at Sreerungum ... 138
General conclusions ... 139

PART II.

MICROSCOPIC OBSERVATIONS.

PARA.
Table showing the principal characters of choleraic dejecta ... 140
Reaction of the fluids ... 141
Physical characters of the fluid ... 142
Specific gravity of the fluid ... 143
Physical characters of the sediment ... 144

I.—Microscopical characters of choleraic dejecta. Percentage of cases containing epithelium ... 145
Illustrative case ... 146
Small percentage of epithelial dejecta not exceptional ... 147
Disintegrative action of the alkaline fluid ... 148
Distinct epithelium found in post-mortem examinations ... 149
This epithelium sometimes molecular, at others normal ... 150

II.—Percentage of cases containing red blood-corpuscles ... 151
Effect of the choleraic fluid on red blood-corpuscles ... 152
Objection to laying much stress on the occurrence of red blood-corpuscles ... 153
White blood-corpuscles considered elsewhere ... 154

III.—Percentage of cases containing infusoria, exclusive of *vibriones*, &c. ... 155
1. *Cercomonads* most abundant ... 156
Characters of commonest form ... 157
Characters of the other variety ... 158
Processes of multiplication and probable identity of the two forms ... 159
They may be mistaken for epithelial cells ... 160
Occasionally are circular ... 161
2. *Monads* distinct from the above ... 162
Occasionally present in extreme abundance ... 163
3. *Amœbæ* ... 164
Numerous dejecta contain such bodies ... 165
Multiplication by gemmation ... 166
Variations in duration ... 167
Illustrative case ... 168
Changes taking place in *Amœbæ* ... 169
Points of interest regarding *Amœbæ* ... 170
They may be mistaken for epithelial cells ... 171
Development of *Amœbæ* and *Monads* in a choleraic solution ... 172
One mass of free bioplasm resembles another ... 173
Bacteria and *Vibriones* ... 174
No evidence of peculiar profusion in choleraic media ... 175
No evidence of peculiar forms in choleraic media ... 176
Influence of re-agents on *Bacteria*, &c. ... 177
General results of observations on *Bacteria* and *Vibriones* ... 178

IV.—Percentage of cases containing fungal cells ... 179
Cases in which fungal cells were present ... 180
Spores rare and accidental ... 181
Cysts ... 182
No special development of fungi on choleraic media ... 183
Characters of commonest species on choleraic media ... 184
Occasional occurrence of *Eurotium* ... 185
Characters of another common species ... 186
Other common species ... 187
Penicillium much less frequent than *Aspergillus* ... 188
General results of experiments and observations on fungi ... 189

V.—Oval and circular cells ... 190
Constant and abundant ... 191
Illustrative cases ... 192
Assertions that there is no evidence of new cells in cholera ... 193
Much of the material of the flocculi may be due to disintegration of normal elements ... 194
The flocculi not mere masses of débris ... 195
Rapid disintegration does not disprove new formation ... 196
The dejecta almost always full of cells ... 197
What is the nature of these ... 198
Various kinds present ... 199
A great proportion of undetermined nature ... 200
Complication regarding their nature ... 201

VI.—Miscellaneous bodies occasionally occurring in choleraic dejecta ... 202
General results of observations on choleraic dejecta ... 203
Table facilitating comparison of choleraic with non-choleraic dejecta ... 204
Reaction of non-choleraic dejecta ... 205
The dejecta of diarrhœa may assume the characters of those of cholera ... 206
Microscopical characters.—1, infusoria; A, *Monads* and *Amœbæ* ... 207
Reaction of infusorial dejecta ... 208
Half the cases in which these infusoria were abundant, the result of saline purgatives ... 209
Illustrative cases ... 210

PARA.
Almost every microscopic character of choleraic dejecta may appear in those of diarrhœa ... 211
Mere fluidity of medium does not secure abundance of infusoria ... 212
B. *Vibriones* and *Bacteria* ... 213

2. Fungi, illustrative cases ... 214
Results of cultivations ... 215
Abundant discharge of fluid without choleraic symptoms ... 216
Assumed non-absorption in cholera ... 217
Results of cultivation of non-choleraic dejecta ... 218

3. Oval and circular cells ... 219
Illustrative cases ... 220
Many of these cells probably due to gemmative processes in the *Amœbæ* ... 221
Features distinguishing them from oil-globules ... 222
Experiments on development of such cells ... 223
This development capable of explaining peculiar appearances of the cells ... 224
Formation of masses, &c. ... 225

4. Miscellaneous objects occurring in non-choleraic dejecta ... 226
General conclusions ... 227

NOTE A.

RESULTS OF MICROSCOPIC EXAMINATION OF SPECIMENS OF WATER IN VARIOUS PARTS OF THE MADRAS PRESIDENCY.

MADRAS.

No.
Water from mess-house tank, Perambore ... 1
Water from left wing lines, Perambore ... 2
Water from right wing lines, Perambore ... 3
Water from the Cooum ... 4
Water from a well in the Madras Penitentiary ... 5
Water from a well in the Madras Penitentiary ... 6
Water from a well in the Madras Penitentiary ... 7
Water from a tank near the sewage farm ... 8
Water from a tank in a hutting ground near the sewage farm ... 9
Water from the tank at the cart-stand, Sydenham's Road, Choolay ... 10
Water from a tank near some huts, Ashtaboogum Road, Choolay ... 11

PALAVERAM.

Water from the tank near the bazaar ... 12
Water from a well near the priest's compound ... 13
Water from another well ... 14
Water from a well on the east side of the cantonment ... 15
Water from a well near the depôt barracks ... 16
Water from a well in front of the midwifery ward ... 17
Water from a well in front of No. 4 Hospital ... 18
Water from a well in the native parcherry ... 19

OOTACAMUND.

Water from the new reservoir ... 20
Water from the Dodabet reservoir ... 21
Water from the lower end of the lake ... 22
Water from the upper end of the lake ... 23

SALEM.

Water from the river ... 24
Water from Kichipolum well ... 25
Water from Chitra Savody well ... 26

SHERVAROY HILLS.

Water from a well at Yercaud ... 27
Water from a pond below the church, Yercaud ... 28

BANGALORE.

Water from the Alsoor tank ... 29
Water from a well ... 30

TOOMCOOR.

Water from the large tank ... 31

CORA.

Water from the tank ... 32

TIMMARAJANAHULLY.

Water from the well ... 33

LINGANHULLY.

Water from the well ... 34

TARDAD BEGOOR.

Water from the well ... 35

CLOSPETT.

No.

Water from the river ... 36

MYSORE.

Water from the tank near the jail ... 37
Water from Karangie tank ... 38
Water from the large tank ... 39
Water from Poorniah's channel ... 40
Water from Veernagerry Soobahi draw-well ... 41
Water from a well in the centre of the town ... 42
Water from a well in Kristnaraj Mohalla ... 43
Water from the tank on the summit of Charmandi Hill ... 44
Water from a well in Davaroy Mohalla ... 45
Water from a well beyond municipal limits ... 46

TANJORE.

Water from the large tank in the small fort ... 47
Water from a well in the fort ... 48
Water from Iyan Colum tank ... 49
Water from a well in the jail ... 50
Water from the fort ditch ... 51

TRICHINOPOLY.

Water from a drainage channel ... 52
Water from the Tanjore tank ... 53
Water from the well used by the Artillery ... 54
Water from the Cauvery ... 55
Water from the well used by the Infantry ... 56
Water from a well in Poothoor ... 57
Water from the well between the Artillery hospital and barracks ... 58
Water from a well in William's Road ... 59
Water from Teppa Colum tank ... 60
Water from Saiyan tank ... 61
Water from Thalavoy tank ... 62
Water from Kotwal Choultry tank ... 63
Water from Mr. Banbury's new tank ... 64
Water from the tank in the rock fort ... 65
Water from a well in Sreerungum ... 66

BELLARY.

Water from the tank in the fort ditch ... 67
Water from the tank near the traveller's bungalow ... 68
Water from the well in the Cavalry lines ... 69
Water from the well in the graveyard, affording drinking water to the Cavalry ... 70
Water from a well in the same graveyard ... 71
Water from a well in the compound of the Civil Dispensary ... 72

COTTAPULLY.

Water from the village well ... 73

NOTE B.

COMMON FORMS OF MICROSCOPIC FUNGI IN CALCUTTA, &c.

I.—COMMON FORMS IN CALCUTTA.

PARA.

Fungi affecting rice ... 1
Results of experiments on growing rice plants ... 2
The German rice fungi not found ... 3
Frequent occurrence of fungoid grains in the rice of the bazaars ... 4
Results of cultivation of such grains ... 5
Peculiar form appearing in a cultivation on moist earth ... 6
Commonest mucedinous fungi in Calcutta ... 7
Ascophora of rice and wheat-flour ... 8
Aspergillus developed in water ... 9
Fungus on mango leaves, &c. ... 10
Species of Stilbum ... 11
Sphæriacei ... 12
Sphæronemei ... 13
Æcidium ... 14

II—COMMON FORMS OF MICRO-FUNGI IN THE NEILGHERRIES.

Abundance and conspicuousness ... 15
Penicillium ... 16
Mucor ... 17
Eurotium ... 18

PARA.
Rhinotrichum (?) ... 19
Dematiei ... 20
Cladosporium ... 21
Helminthosporium ... 22
Sphæronemei ... 23
Fungus of the coffee plant ... 24
Coleosporium. Æcidium ... 25
Fungus on cinchona leaves ... 26
Sphæriacei, &c. ... 27 28

III.—FORMS OF MICRO-FUNGI COMMON IN TANJORE.

Only a few species obtained ... 29
Fungoid rice, &c. ... 0
Presence of fungi in the air of various localities ... 31
General results of examinations of fungi ... 32

NOTE C.

DEVELOPMENTS OCCURRING IN SOLUTIONS OF CHOLERAIC MATERIALS

Experiments on cholerized solutions ... 1
Formation of "proligerous pellicle" ... 2
Amœbæ and monads most frequent ... 3
No infusoria peculiar to choleraic solutions ... 4

APPENDIX B.

Dr. D. CUNNINGHAM'S REPORT ON CHOLERA.

PART I.

PETTENKOFER'S THEORY ILLUSTRATED IN MADRAS.

Impossibility of deciding definitely regarding the validity of the soil theory at the present time.

1. In endeavouring to arrive at any definite conclusions as to the accuracy of the views in regard to cholera, which have been expressed by Professor Pettenkofer, it must be premised that no opinion regarding the truth or error of the theory can be formed until an extensive series of accurate data has been accumulated, showing the precise physical conditions of localities during the prevalence of cholera, with the special distribution of the disease in them as regard both time and place; and until these facts have been compared with the conditions of the same localities during periods of exemption, and with those of other localities which may have been temporarily or permanently exempt. The acquisition of such data necessarily requires time, and can only be thoroughly secured by means of prolonged local study and observation.

Certain facts may indicate validity or fallaciousness of objections.

2. Even a cursory inspection may, however, afford considerable information in regard to the compatibility of the theory with the general history of the distribution of the disease, and may at least serve to determine whether certain *à priori* objections to it, on the grounds of its supposed inapplicability to particular localities, are valid or not.

Correctness of the facts on which Pettenkofer founds the theory undoubted.

3. The correctness of the facts on which Professor Pettenkofer has founded his theory is doubted by no one, but some authorities have questioned whether such facts are of universal applicability, while others consider that their significance may be otherwise interpreted.

Dr. Buchanan's interpretation of these facts.

Considerations regarding this interpretation.

4. Among the latter we find Dr. Buchanan, who, apparently under the impression that Pettenkofer's ideas are incompatible with the benefits derived from sub-soil drainage, endeavours on *à priori* grounds to prove that subsidence of water-level necessarily implies increased liability to contamination of wells; this increased liability being supposed to be due to the drainage areas of wells being increased in proportion to the subsidence. But allowing that the drainage areas are increased, this increase is surely almost necessarily associated with a commensurate increase of the filtering layers of soil, and (in those cases at least where the water-level is dependent on local rainfall) with a decrease in the amount of water to wash down impurities, so that, although there may be a certain amount of concentration of the impurities already present, there will be diminution in the quantity of entering material.

Objections to the soil theory due to misunderstanding.

5. Many of the objections and facts which are advanced as disproving the theory appear to arise from a misunderstanding of what its essential points in reference to soil really are. For example, objections are not wanting, founded on the idea that a subsidence of water-level is essential, in place of a peculiar stage of soil moisture attainable in diverse localities, either by a subsidence, or an increase according to their physical conditions. Other objections are founded on the idea that some special kind of soil is necessary in place of a special condition which may be present in soils varying greatly in many of their characters; and others again depend on vague general ideas regarding the nature of the soil in special localities. For example, it is not unfrequently asserted that certain places in which cholera is prevailing, or has prevailed at some previous time, are in a part of the country occupied by pure rock. This generally seems to mean that the soil is very thin, and that there is much out-cropping rock, for it is manifest that the existence of pure rock surface is a condition which can only be of extremely partial occurrence without rendering the locality in which it occurs almost uninhabitable, and the mere fact that the soil in any place in which cholera prevails is very thin can hardly be adduced as discrediting the soil theory.

Misapprehension regarding the nature of the observations which are necessary to furnish valuable data.

6. While considering the various objections which are brought forward, it may not be out of place to remark that, in certain quarters, there appears to be a considerable amount of misapprehension as to the observations in regard to soil moisture which are desired with a view to acquiring data on which a judgment in regard to the merits of the theory may be founded. It seems not always clearly understood that mere

random selection of a well and the application to it of an apparatus to indicate changes in the level of the water are not necessarily sufficient to secure valuable results. It is true that in certain localities with a homogeneous and porous soil, in which the water-level is near the surface, almost any well is capable of affording valuable information as to the prevailing conditions of soil moisture. But, on the other hand, in many districts with shallow soil and an undulating surface, no less than three different orders of wells exist (*vide* Plate I, Fig. 1). First, common surface wells (A), in which the water level is dependent on the amount of water present in the soil; second (B), wells deeply sunk into the impermeable substratum, but deriving their entire water-supply from the drainage into them of the soil moisture of the locality; third (C), wells sunk into water-bearing strata below the first impermeable layer. Now it is plain that observations on the level of the water in B and C cannot afford information of any value regarding the soil moisture of the locality in which they are situated; for the latter is only very partially dependent on local sources, while in the former, although the water is derived from local drainage, it is placed entirely in abnormal circumstances, as regards diminution due to evaporation, removal, &c. Wells such as A will afford the desired information regarding the soil conditions of the precise locality in which they are situated, but they cannot be supposed to give exact information regarding the conditions prevailing in any place, however near to them, which is in a different drainage area, and with a soil different in character, in depth, and in general configuration, (*vide* D); for it is manifest that the conditions prevailing at any given time in a deep hollow, with considerable soil accumulation, such as in the case of A, will by no means necessarily correspond with those contemporaneously present in a wide and shallow basin in a very thin soil, as in the case of D. The water originally present in the two areas may have been equal in amount, but in D, owing to the shallowness of the soil and the large exposed suface, evaporation will cause very rapid diminution, and may thoroughly dry the soil at a time when there is still much moisture in the deeper hollow, A.

Various classes of wells present in districts with a shallow soil.

7. There is still another class of wells regarding the capability of which to afford the requisite data, there must be very great question. This class includes those wells situated in very deep soils, in which the water-level is permanently very far removed from the surface of the ground. The water in these wells, 80 or 100 feet from the surface, may really occupy the first water-bearing stratum, and may yet be incapable of affording information regardingthe assumedly important changes in soil moisture. In such cases, it is extremely improbable that any amount of organic matter can reach the water-bearing stratum by percolation, as it must almost inevitably be filtered out,* and unless the local rainfall be excessive, it is very problematical whether the surface water due to it can reach this layer either. Taking these things into consideration, it seems quite clear that in such a soil changes in the moisture of the organically polluted layer of soil and in the water-level of the water-bearing stratum, may, and probably do, take place quite independently of one another, and consequently that the indications afforded by one do not determine what the state of the other is.

Another class of wells which appear incapable of affording exact data.

8. In short, observations are of no value unless they furnish indications as to the condition of that layer of soil in any locality in which accumulation of organic matter and changes in moisture occur, and observations on water-level in wells are only useful when they furnish such indications. It has been urged as an objection to the soil theory "that it hardly helps us on very far;"† but surely a theory, however open to objection it may be on this ground, if it be consistent with facts, is more valuable and more likely to prove of practical benefit than theories of the greatest definiteness and clearness, which are not consistent with facts. It may well be doubted whether any of the theories which have been advanced with regard to cholera is consistent with, and capable of explaining, all the facts as to the origin and spread of the disease, but unfortunately each theorist is apt to imagine that his own peculiar views represent not merely a certain amount of truth, but the whole truth.

Characters in observations rendering them of value.

Practical objection to the soil theory.

Until the number of accurate observations and facts as distinguished from mere impressions is very much larger than it is at present, it is only with the very greatest reservation that any one theory can be accepted. What is required in the meantime is the careful collection of facts, a comparison of these with one another, and a patient investigation of their adaptability to the various current theories.

Necessity of waiting for the accumulation of data.

9. Without occupying further space with general remarks, I shall give a brief account of the facts confirmatory of, or adverse to, the soil theory furnished by various localities recently visited in the Madras Presidency and Mysore.

Facts in connection with the soil theory observed in the Madras Presidency and Mysore.

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* *Vide* experiments on filtration of sewage through natural soils.—*First Report of the Rivers Pollution Commission.*

† It must be remembered, on the other hand, that "the utility of a theory by no means implies its truth."—*The Genesis of Species.*

Nature of the soil in Madras compatible with liability.

10. **Madras Town and the immediate neighbourhood.**—The most important points to be noted here are:—

1*st.* The nature of the soil on which Madras is built is such as, according to the soil theory, will satisfactorily account for its general liability to cholera, while at the same time, as in any other old sea-bed or alluvial deposit, the variations in the soil in special areas are such as to warrant the expectation of corresponding variations in the general and seasonal liability to the disease. These variations in soil conditions in different areas are such as to require very careful observations as to the particular times and conditions in which the inhabitants are attacked. The first and important water-layer seems almost everywhere to be close to the surface, due to the presence of a bed of very dense, black impermeable clay. The importance of this clay as a water-retaining stratum is demonstrated by the fact that great caution is necessary in deepening the beds of tanks, as, should the excavation be carried so far as to remove the stratum of clay, the water is no longer retained, but runs off into the loose sandy soil beneath. In some places this clay has been laid bare, and here of course the water lies on the surface; in others the superimposed soil is very thin, and nowhere does it exceed a few feet in thickness. In Perambore, a district peculiarly subject to cholera, this is specially the case. Thanks to the kindness of Colonel R. Cadell, R. A., I was enabled in December to have an examination made in the compound of the Government Powder Mills, which clearly showed the nature of the soil. The water-bearing stratum was, in the spot examined, at about four feet from the surface, the water occupying a layer of almost pure sand immediately above the black clay, and beneath a layer of sandy-made soil. The special local variations in the thickness of the stratum above the water are very well shown in the same place, as at the other end of the same compound; the water is two or three feet further from the surface of the ground.*

Facts regarding the seasonal occurrence of cholera in Madras.

Dr. Balfour's statistics.

2*nd.*—The second point of importance in regard to the soil theory, as applied to Madras, is, that the cholera seasons in Madras coincide with periods in which a considerable amount of change in soil moisture is occurring, *viz.*, during the drying after the north-east monsoon, and during the moistening of the south-west monsoon, the disease diminishing or dying out at the periods of greatest dryness and greatest moisture. The following table, showing average rainfall for 60 years, and total cholera deaths from 1855 to 1869, is extracted from Inspector General E. Balfour's statistics of cholera:—

	Jan.	Feb.	March	April.	May.	June.	July.	Aug.	Sept.		Nov.	Dec.	Total.
Average Monthly rainfall for 60 years ...	0·89	0·23	0·48	0·68			3·46	4·38	4·58	10·90	12·90	5·42	47·82
Total Monthly cholera deaths, 1855 to 1869	2,918	2,866	1,843		973	884	2,464	2,875		2,150	1,396	1,561	23,677

From this table we learn that cholera in Madras increases at two distinct periods of the year, "the two distinct rises being in the cool dry weather of January to February, and during the hot, close, humid, dead atmospheres of July to October." Dr. Balfour remarks that the severest outbreaks occur in Madras in two periods of the year, possessing very dissimilar physical characters, and certainly the only physical character which the data appear to indicate as likely to be common to the two is a certain degree of soil moisture attained in one by drying, and in the other by moistening. These facts regarding the seasonal occurrence of cholera in Madras appear to be very worthy of the attention of the advocates of the various water theories. If water be the *nidus* in which the poison is manufactured and the vehicle by which it is diffused, there must be special facilities for the entrance of choleraic material into the water-supply of Madras at two distinct periods of the year,—periods in neither of which there is much rainfall to account for general in-washing of the surface and soil impurities. If, on the other hand, water contaminated with organic matter is all-important to ensure the spread of the disease, and if this contamination increases with the diminution in bulk of the water-supply due to the continuance of hot dry weather, how does it happen that the greatest and most persistent decrease in cholera in Madras occurs in the hottest and driest month in the year?†

Difficulties in regard to the application of water theories to the explanation of these phenomena.

Important bearing of the stations of Palaveram and St. Thomas Mount on the soil theory.

11. **Palaveram and St. Thomas Mount.**—Both of these stations merit careful study in reference to the soil theory, as they show remarkable differences in their liability to cholera without any very apparent differences in soil. Both are much less prone to cholera than Madras, and Palaveram presents a very good example of

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* It must be noted here that the facts in connection with the Powder Mills by no means favor the idea that soil conditions are all-important in the production of cholera, as, in so far as the evidence goes, the employés, although working in the midst of a district specially prone to cholera, and in a locality the soil of which does not differ from that of the surrounding area—a soil which from its characters would appear, according to the soil theory, to be specially favorable to the development of the disease—do not suffer much from it, but rather appear to enjoy a certain amount of immunity.—*Vide* Proceedings of the Sanitary Commissioner for Madras, November 1870.

† For results of microscopic examinations of Madras waters, *vide* Note A., 1—11.

Soil as compared with that of Madras.

what may be roughly styled exemption. They are situated respectively at 12 and 9 miles from Madras, on the road between it and Chingleput, and on the southern side of the Adiar river. On this side of the river the soil is very different in its characters, gneiss rock and laterite replacing the sand and black clay of Madras; and it has been remarked by Dr. Cornish that, taking the two areas generally, the places situated in the former are much less prone to cholera than those in the latter. This, however, taken alone, by no means necessarily implies any direct influence of soil, as a difference in soil frequently implies a difference in liability to water contamination.

Palaveram.

Nature of the soil.

Water-supply.

Situation of bazaar.

12. PALAVERAM.—Palaveram is situated to the landward side of a range of low gneiss hills on the ground which subsides gradually from its base towards the Adiar. The soil consists of a reddish clay, beneath which is a thin layer of laterite over the metamorphic rock. Towards the base of the hills the soil is very thin, allowing bare rock surfaces to crop out over large areas. There is a plentiful supply of excellent water, attainable at no great depth by wells sunk into the laterite and gneiss rock.* There is also at least one tank close to the bazaar, but the water of this is not used for drinking purposes. The bazaar is situated on sloping ground, and has perfect natural drainage without any risk of contamination of the water-supply. Between it and the sloping ground occupied by the lines, hospitals, and houses of the European veterans, there is a slight hollow, and on this the "Dhobie Village," a small collection of native huts, is situated.

Reputation for immunity.

Facts regarding cholera in 1869.

Failure of any purely contagionist explanation of the relative immunity of Palaveram.

Liability of the "Dhobie Village."

13. The inhabitants of Palaveram have always enjoyed a reputation for immunity from cholera, and, in as far as the military population is concerned, this appears to be well founded, the exemption holding good even to the present time. With regard to the inhabitants of the bazaar, however, complete immunity can no longer be supposed to exist, as in the autumn of 1869, 24 cases occurred. Still the fact remains that there is very little liability to the disease, as "this is the first outbreak that has occurred within the recollection of the present medical officer, whose experience of the station extends to eleven years."† This immunity, or at least slight liability, may be ascribed to various causes, and interpreted so as to support various theories. But it is at any rate entirely opposed to any theory which ascribes the spread of cholera to the influence of contagion strictly so called, for we have here a locality on the high road between Madras and Chingleput, both cholera centres. Into this locality cholera has been actually introduced on various occasions by individuals who have died of the disease shortly after arrival from Madras and other neighbouring localities, and yet the military population has remained unaffected. As above remarked, in one authenticated instance only, namely in 1869, has there been any development of the disease in the bazaar. In connection with this point, it is also worth noting that the "Dhobie Village," previously mentioned, by no means shares in the immunity of the rest of the station, but is liable to frequent outbreaks of the disease; and, as it is situated in the middle of the station, it is clear that isolation is not the protective agent.

Water and soil theories as applied to Palaveram.

The good quality of the water and the thorough natural drainage will satisfy the requirements for immunity according to the water theories, and more especially those of that theory which regard impure water as ensuring development of the disease after the addition of the poison introduced by human intercourse. The nature and general configuration of the soil also will satisfy the requirements of the soil theory as preventing accumulation of moisture and organic impurities in it.

Difficulties in connection with the cholera of 1869.

14. When, however, we come to the facts relative to 1869, there appears to be no thoroughly satisfactory explanation derivable from any theory, for we have no recorded facts tending to show any reason for a special condition of soil, or a special liability to contamination of water-supply in this year. It is possible that, were more accurate data attainable, either the soil theory or the theory which regards organically contaminated water as a necessary second factor might account for the exceptional facts; but the other water theory can hardly step in here with its ready assumption of the accidental entrance of choleraic matter into the drinking water, and the consequent manufacture of the poison in this year; for there was no regular outbreak of the disease indicative of a temporary poisoning of the water. Detached cases occurred, scattered up and down the bazaar, from the 9th September till the 16th October, one case occurring regularly every day for some time.

Argument against the soil theory.

It may be argued that the soil theory as applied to a locality of this kind, with a shallow soil, hard rocky basis, and general slope of surface, would necessarily imply the existence of complete and permanent immunity. But it must be borne in mind that a soil may be shallow and porous, and the general surface be evenly sloped so as to secure thorough drainage, as a general rule; while at the same time it is quite possible, and may be sometimes actually demonstrated, that localized and partial accumulations of moisture and organic impurities may exist in it. The rocky basis by no means necessarily exactly follows the contour of the ground, but is frequently marked by depressions and irregularities of which no indication is afforded by the surface. (*Vide* Plate I, Fig. 3.)

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* For results of microscopic examination of water, *vide* Note A., 12—19.

† *Report on Cholera in Southern India for the year* 1869, by the Sanitary Commissioner for Madras.

Possible reasons for liability of the "Dhobie Village."

15. The liability to cholera of the "Dhobie Village" may be accounted for by either the soil or water theories. For, lying in a hollow, as it does, it is naturally subjected to the accumulation of organic impurities and of a varying amount of moisture in the soil,* and the same causes rendering its soil liable to contamination will almost necessarily affect the water in the surface wells, rendering it liable to act as a predisposing agent, and giving it a fair opportunity of receiving material for the direct manufacture of the poison.

St. Thomas Mount.
Character of the soil.

16. ST. THOMAS MOUNT.—This station, although it has not the decided immunity of Palaveram, is yet by no means specially liable to cholera. The greater portion of the cantonment lies to the east of the Mount on ground which slopes gradually to the native bazaar and the low paddy ground between the latter and the sea. The soil, in its general characters, is very similar to that at Palaveram, but the gneiss has here, according to Dr. Cornish, been disturbed by the injection of trap, and the laterite does not form so even and continuous a layer. One of the most marked physical differences between the two localities is the absence of an abundant supply of water in the soil at the Mount, which is probably dependent on the much smaller amount of hill surface present here. The wells are very deep, the water generally standing at a low level in them, and in some cases almost or quite failing in the dry weather. In fact, the majority of the wells appear to belong to the Class B of page 148.

Measurements of water-level in three wells were taken in December with the following results :—

No. of Well.	Level of water from surface.		Depth of Water.	
	Feet.	Inches.	Feet.	Inches.
1. Well at the Troop Barrack ...	6	0	25	0
2. Well in Artillery Barrack ...	37	0	16	0
3. Well near Infantry Barrack ...	36	9	34	6

This last well dried up entirely in the hot weather of 1870.

Importance of the relative positions of the bazaar and barracks.

Atmospheric influences of the Mount.

The position of the bazaar is of some importance in considering the facts regarding cholera in this station. It lies on low ground close to paddy fields, and is so situated that the sea breeze in passing inwards necessarily traverses it before reaching the barracks, lines, &c., and even when the atmosphere is very still, the heating of the exposed surfaces of the Mount must tend to establish an inward current from the low ground.†

Points to be noted in this station in connection with the soil theory.

17. In reference to the liability of this station to cholera, as compared with the almost complete exemption of Palaveram, it is of importance to note two points,—1*st*, that there is here a large bazaar situated on ground of such a nature as by no means to warrant the expectation of immunity in it; and 2*nd*, that it is so situated that currents of air must constantly be passing from it over the localities occupied by the troops. There are then two reasons, according to the soil theory, why cholera should be more likely to occur among the troops here than among those at Palaveram. In the first place, there is the likelihood of the occurrence of cases directly contracted in the non-exempt area of the bazaar; and, secondly, there is the probability of exposure to the poison developed in the soil of the bazaar and its

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* That it is subject to considerable fluctuations in soil moisture was very clearly manifest when it was visited in December 1870, for at that time the shallow surface wells in the gardens round some of the houses were full to within a few inches of the surface, due to the heavy rainfall of the north-east monsoon. One such well was pointed out, in which there was then 5 or 6 feet of water, and which was said to dry up entirely during the hot weather.

† "The climate resembles that of Madras, but from the proximity of the station to the hill from which it derives its name, the temperature exceeds that of Madras generally two degrees."—*Reports on Civil Stations and Military Cantonments, &c.*, by Inspector General of Hospitals D. Macpherson, Madras, 1862.

Contrast with conditions prevailing at Palaveram.

neighbourhood, and conveyed inwards by currents of air dependent on the sea breeze and the local atmospheric influences of the Mount. Neither of these causes are to be found in existence at Palaveram. In Palaveram the bazaar is situated on ground favoring exemption, and even were it not so, the relative positions occupied by the bazaar and the rest of the station in relation to the hills and sea breeze are such that there is no special tendency to the establishment of currents of air passing from the one to the other.

Dr. Balfour's statistics of relative liabilities of bodies of troops stationed at the Mount.

Relative positions of the barracks.

18. The statistics adduced by Inspector General Balfour in regard to this station are important, as showing that, even within its limits, different areas vary in their degrees of liability. They show that the ratio of admissions from cholera per 1,000 of mean strength of European Horse Artillery, during a given period of years, was 13·36; that of European Foot Artillery 2·50, and that of the Native Golundauze 3·84. Now, the most marked difference between the soil conditions of the Horse and Foot Artillery barracks is apparent from the well measurements previously given. The "Troop barrack" lies to the south of the Mount on lower ground than the Foot Artillery barracks, and the well there shows the presence of water close to the surface; while the water-level and occasional failure of the wells in the neighbourhood of the latter buildings seem to indicate that there is no accumulation of soil moisture there, and that the wells, situated as they are on the ground sloping from the base of the hill, are mere local reservoirs which catch the water in its passage to the lower ground. The wells of the "Troop barrack" may be more liable to surface contamination, but the others must be more subject to extreme concentration of contained impurities.

Relative immunity of the Neilgherry plateau.

19. THE NEILGHERRIES.—There appears to be no question that up to the present time, an almost, if not quite perfect, immunity from cholera has prevailed in the Neilgherry plateau.

This immunity exists in spite of constant communication with localities prone to cholera.

And in spite of actual introduction of cases of the disease.

Many phenomena favorable to Pettenkofer's views.

The generally accepted belief is that the immunity is perfect, but I am informed by Dr. Cornish that a few cases did on one occasion occur in Ootacamund, which could not be accounted for, save on the supposition of a certain amount of local development of the disease. The general immunity is, however, sufficiently remarkable, more especially when the fact of the constant traffic and communication with the plains is borne in mind. Any one descending the Ghât to Metapollium on the day previous to the weekly fairs at Coonoor and Ootacamund, must realize that isolation and consequent non-liability to introduction of a poison can hardly in this case afford a satisfactory explanation of the non-occurrence of the disease, and this is confirmed when it is remembered that cases of cholera have been imported from the plains, the patients dying in the Ghâts, or shortly after arrival on the plateau. The locality in itself seems to present some conditions unfavorable to the development of the disease. What the exact nature of these conditions may be is of course a matter of doubt in the present state of our knowledge, but there are many things present which seem to favor Pettenkofer's views as to the importance of soil.

Nature of the soil.

Accumulations of soil moisture can only occur in localized spots.

20. The basis of the plateau is formed almost exclusively of gneiss rock. On this a thick layer of dense retentive clay is superimposed. The surface soil is formed of vegetable mould from two to three feet in thickness, and between this and the clay there is a layer of gravel varying in thickness from a few inches to several feet. The clay stratum varies much in depth in various places; for, formed as it appears to be by the gradual disintegration of the gneiss, it is on the slopes of the Ghâts constantly liable to be washed away by the rains; while, on the other hand, on the comparatively level surface of the plateau, it settles down *in situ*, and accumulates in layers of constantly increasing thickness. It presents various shades of red, white, and yellow, and frequently on section shows the markings of the rock from which it is formed with bands of quartz still persisting in an unaltered state. Its great density is demonstrated by the hardness and sharpness of outline which such sections retain, their surfaces being so compact and firm that they become covered with lichen, like unaltered rocks, and unless directly exposed to the sun, it retains its moisture during long periods of dry weather. Now, when a soil of this kind is associated with general undulation of surface, like that prevailing on the plateau, it is evident that conditions such as those prescribed by Pettenkofer for the development of cholera can only be of very partial occurrence, for the soil water passing readily through the vegetable mould and gravel comes upon the dense retentive clay, and having reached this runs along its surface, and can only accumulate in the basin-like hollows occurring between some of the slopes. "The rain which falls during the wet season, instead of running off to waste at once, as it does from the surface of the hard ground, is imbibed and retained by these morasses to such an extent that throughout the year, including the whole of the dry monsoon, a constant and abundant supply

of water is yielded by these natural reservoirs."* It is then only in these hollows that the assumedly important accumulation of organic matters and gradual fluctuations in soil moisture can take place to any extent; and the inhabitants of any collection of houses occupying such a locality cannot be supposed to be living under conditions conferring exemption. Throughout the plateau there are few houses so situated. The Badaga villages, the Toda Munds, &c., are almost invariably on slopes providing thorough drainage, and the same holds as regards the European houses and the greater portion of the bazaar at Ootacamund. The lower row of houses in that bazaar however, and great part of the village of Candle, lie so low that they can hardly be supposed to be otherwise than subject to the soil conditions of liability, and this is more especially the case as regards the former, situated as it is on low flat ground, which is close to the margin of the lake, almost on the same level as the water, and liable to pollution by organic matters draining from the upper portions of the bazaar which occupy the steep incline at the lower part of the hill on which the jail is situated,—a hill on which the clay stratum is only covered by a very thin layer of loose soil.

Positions of habitations on the plateau are generally fortunate.

Exceptions.

21. The general immunity of the Neilgherry plateau appears to be quite in accordance with the requirements of the soil theory, and therefore in so far confirmatory of its soundness. But at the same time this immunity cannot be said to be explicable by means of it alone, to the exclusion of others, since here, as previously noted in reference to Palaveram, the facts are capable of being interpreted in support of various theories. The water in the streams is of extreme purity, and a great bulk of the inhabitants use such water. No doubt many of the inhabitants of Ootacamund derive their water-supply from wells in which the water at some times of the year is close to the surface. Looking at the physical nature of the soil alone, it might be assumed that such water was specially liable to contamination from the entrance of organic impurities by drainage through the soil; and so it almost necessarily would be, had not the soil, as I am informed by Mr. Broughton, Chemist to the Cinchona Plantations, a very great power of retaining and absorbing such impurities. Where the water is derived directly from any of the marshy hollows, it is liable, occasionally at least, to contain a considerable amount of organic matter. That this is the case appears to be demonstrated by the condition of the water in the new reservoir for the water-supply of Ootacamund. This, in the autumn of 1870, showed very decided microscopic indications of organic pollution,—a pollution the existence of which, though at first much doubted, was confirmed on chemical examination.† Allowing, however, for all ordinary contingencies, the water-supply, unless directly contaminated by drainage, as in the case of the lake at Ootacamund, is of excellent quality, so that the facts speak nearly as much for the water as for the soil theory. The only theory which totally fails to explain the occurrence of so marked an instance of exemption is that of the pure contagionists, in which direct communication of the poison from person to person is supposed in itself to be sufficient to ensure the spread of the disease. If this were all that were necessary, it is almost incomprehensible how any locality such as the Ootacamund bazaar, dirty and crowded as it was formerly,‡ and to a certain extent is still, should have for so long a time enjoyed an almost complete exemption, in spite of constant communication with localities in which cholera prevails; nay more, even in spite of the actual introduction of the disease into it. This comes out with all the greater force when we take into consideration the facts in reference to the occurrence of small-pox within this area of exemption from cholera, for we do not find that the former disease has any difficulty in establishing and diffusing itself, but, on the contrary, that it is one of the most prevalent and fatal diseases occurring among the inhabitants of the plateau.§

The explanation of the relative immunity of the plateau afforded by the soil theory not the only tenable one.

Good quality of the water.

Sources of water-supply occasionally liable to organic contamination.

Total failure of contagionist explanations.

Facts regarding small-pox.

22. The facts of the case seem decidedly to indicate the probability that the exemption from cholera enjoyed by the inhabitants of the Neilgherry plateau is to be ascribed to some of the physical conditions under which they live; and, certainly, among the most striking of these are the general configuration of the surface, the nature of the soil, and the excellence of the water-supply, the two former taken together providing an abundance of well-

Immunity to be ascribed to some physical condition or conditions.

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* *Geographical and Statistical Memoir of a Survey of the Neilgherry Mountains*, by Captain J. Ouchterlony, Madras, 1847.

† For results of microscopic examination of water, *vide* Note A, 20—23.

‡ "Hitherto houses appear to have been erected at the will of the occupiers, and streets formed without regard to drainage or ventilation. The lake is being rapidly encroached upon by the accumulation of refuse and filth on its banks, the same being first turned into garden-ground *and afterwards into building sites*."—Reports by Inspector General of Hospitals D. Macpherson, 1862.

§ The most prevalent disease among the aborigines is small-pox."—Macpherson op cit.

drained sites for habitation. In reference to the soil, it must be carefully borne in mind that the conditions assumed to confer immunity are not universal throughout the whole area, and that the occurrence of locally originating cases of cholera in no way disproves the soundness of Pettenkofer's views, unless it is clearly shown that the precise localities in which they occurred were subject to such conditions. This is of special importance, as it is said that cholera has occurred on the Pulney Hills, and the mere fact of the occurrence of cholera on such a plateau might be held to decide conclusively against the soil theory as propounded by Pettenkofer; whereas, the bare fact of the occurrence of cases of the disease, without accurate data as to their localization, is really of no value as proof either in favor of, or against, the theory.

Occurrence of cases locally originating on the plateau by no means disproves the soil theory.

Importance of Salem as a cholera locality.

23. SALEM.—The town of Salem has long had a bad reputation as a locality specially prone to cholera,* and the facts regarding it are the more worthy of investigation by reason of its close proximity to the exempt area of the Shervaroy Hills. It is 1,000 feet above the level of the sea, and 100 miles in a direct line from the east coast, and it lies in the lowest part of a shallow basin which is bounded by the Shervaroys to the north and by numerous small ranges and detached hills to the south and east. The Tyromuny river, which rises in the Shervaroys, traverses the basin, passing close to the town, and bounding it on the north and west. This river, from its short course and small drainage area, is liable to great fluctuations in the amount of its contained water, and during the dry weather it is reduced to a mere series of isolated pools. The soil throughout the basin is very shallow. It is red and full of fragments of decomposing rock, which prevail to such an extent in some places as to form a sort of gravel which is excavated for use on the roads. The soil within a few feet of the surface passes into the disintegrating rock, and masses of hard unaltered rock crop out in all directions. The water-bearing stratum is almost everywhere very superficial, the water in the majority of the wells and in the hollows and excavations in the soil being, at the close of the monsoon, within a foot or two of the surface.†

Situation of the town.

Nature of the soil.

Fluctuations in amount of soil moisture great.

24. As would naturally be expected in regard to an area like this, which receives the drainage from numerous hill ranges into a shallow and porous soil, the seasonal fluctuations in amount ofs oil moisture are very decided. That this is the case was clearly manifest from the facts observed during two visits to the locality,—the first made in the middle of November 1870, the second in the end of January 1871. In November, after the heavy rainfall of the north-east monsoon, all the wells which were visited in the town, with one exception,‡ showed water within a foot or two of the surface of the ground, the river was full from bank to bank, and numerous shallow depressions of the surface of the ground were occupied by clear streamlets of running water. In January, on the other hand, the wells had sunk considerably, the river had left mud banks exposed in its channel, and the smaller streamlets had, almost without exception, totally dried up. Although a considerable diminution in soil water was evident, there was still, in January 1871, a very unusual amount remaining, due to the exceptionally high rainfall of 1870.§ In consequence of this, neither the wells nor the river were so low as usual at that time of year, nor was the general surface of the country so thoroughly parched, but still retained a considerable amount of greenness.

Water-levels in November 1870 and January 1871.

Facts regarding cholera.

25. The principal facts to be noted in reference to the occurrence of cholera in Salem are as follows:—*1st*, the disease usually manifests itself as an epidemic in the dry weather, beginning to appear in December, when the river has become low,‖ and reaching its maximum in March, April, and May; *2nd*, it is believed that its appearance cannot always be ascribed to the introduction of cases from the outside; *3rd*, the old jail, which lay very

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* "Cholera and intermittent fever have been endemic for many years, specially in March, April, and May. At this time the numerous tanks and extensive rice-grounds in the vicinity are becoming dried."—Macpherson op cit.

† For results of microscopic examination of specimens of water, *vide* Note A, 24—26.

‡ The exceptional well was that in the compound of the Civil Dispensary. In it the water-level is far removed from the surface, and it furnishes an apparent example of unfitness for furnishing data regarding the general conditions of soil moisture in the locality.—*Vide* p. 148.

§ The following figures, extracted from the meteorological register at the Civil Dispensary, show the relative amounts of the rainfalls of the last three years:—

		In Tenths.
1.	From 1st April 1868 to 31st March 1869 ...	... 30·01
2.	„ „ 1869 „ „ 1870 ...	... 37·08
3.	„ „ 1870 to 23rd January 1871 ...	... 42·30

‖ The first case has more than once appeared in a street close to the river.

low, and close to the river, was very subject to epidemic outbreaks of the disease, while the new central jail, situated at some distance from the town and river, and in an open, high and dry locality, shows little liability; *4th*, the chief articles of diet among the native population are *ragi*, *cumboo*, and *cholum*, and as usually occurs in any locality in which the times for the introduction of the new grain into the bazaar, and for the occurrence of cholera coincide, the natives assume that the two facts stand to each other in the relation of cause and effect.

The locality furnishes special facilities for the local development of cholera according to the soil theory.

26. Taking everything into consideration, Salem certainly presents very many features which appear to accord well with Professor Pettenkofer's views as to the importance of soil conditions in influencing the localization of cholera. The general nature of the soil of the valley is precisely that assumed to afford special facilities for the development of the germs of the poison if introduced at a suitable time; the town lies on the lowest part of the valley, close to the river, and the period when cholera manifests itself is one in which subsident changes in water-level and soil moisture prevail,—a period, therefore, which in a locality with a shallow soil receiving the drainage from numerous hills, is likely to present the required soil conditions.

Cholera of 1870-71.

Special dilution of organic impurities involves assumption.

27. In connection with the last point, it is worthy of note that, in the dry weather of 1870-71, the manifestation of the disease was at any rate delayed, as, up to the close of January 1871, there had been very little cholera in Salem, so that in this season an unusual degree of soil moisture coincided with a small development of cholera. It may, of course, be argued that this coincidence is only of importance as implying an unusual bulk of water, and consequently an unusual dilution of the organic matters contained in it; and this, no doubt, may be the case. It must, however, be recollected that there is more or less assumption in such a view of the case, while the state of soil moisture is a positive fact.

Incompatibility of the cholera phenomena of Salem with a purely water theory.

28. Why there should have been special obstacles to the entrance of choleraic material into the water in this particular year remains to be shown. Indeed, as regards the general seasonal occurrence of cholera in the station, it is not very easy to understand how any theory laying much stress on such entrance can account for the facts, seeing that the disease invariably tends to manifest itself after the dry weather has continued for some time, and when there are no special facilities provided for the in-washing of material contained in the soil.

29. The want of definite data concerning the conditions prevailing in previous seasons, deprives the observations regarding those of the past year of much of their value; still there can, at all events, be no doubt that the soil theory appears to hold its ground, and to be quite as much in accordance with facts as any other theory; and there is every reason to hope that the accurate observations on soil moisture which have been recently established will, in a locality such as this is, afford most valuable information.

Situation of the Shervaroy range in relation to Salem.

Size and nature of the plateau.

30. THE SHERVAROY HILLS.—These, from their close proximity to Salem, are rendered peculiarly interesting, as they afford an apparent instance of Pettenkofer's exempt localities, in immediate contrast to an area which is specially prone to cholera. The range forms one boundary of the Salem valley, and at the nearest point approaches within five miles of the town. The plateau has an area of about "100 square miles," and is throughout its greater part from 4,000 to 5,000 feet in elevation. There is hardly any level ground on the plateau, and everywhere throughout it are steep slopes showing an extraordinary amount of smooth denuded surfaces of gneiss rock.

Nature of the soil.

31. The most marked difference in the soil on this plateau, as compared with that on the Neilgherries, is its extreme shallowness, which imparts very peculiar features to the scenery on account of the amount of exposed rock, and of the stunted copse-wood character which it induces in the vegetation. The soil "in forest cleared lands and the deeper valleys is dark vegetable mould of considerable depth, resting generally on reddish clay, arising probably from the decomposition of the surface rocks and locally formed laterite. In opener parts the soil is shallower, of a light brown color, and resting on a similar subsoil. There are also one or two marshy situations, in which, as in similar localities in the Neilgherries, peat has been formed." The soil is in fact very similar to that on the Neilgherry plateau, and has apparently been formed in the same manner by surface accumulation of vegetable mould over a subsoil produced by the decomposition of the gneissic basis of the range. We do not here, however, find the results of this decomposition accumulating in layers of such great thickness as has been the case in the Neilgherries, because, from the general contour of the surface, it is not suffered to remain *in situ* and settle down, but is constantly washed away to the low country in greater or less amount, in many cases to such a

degree as to leave the rock beneath entirely denuded, and almost everywhere sufficiently to prevent any great accumulation.

Streams and wells.

32. "The hill streams are numerous, though of no great size, and, from the sloping nature of the ground, they very rapidly find their way to the low country. They soon diminish in volume after the rainy seasons are over, and in the months of January, February, March, and April many of them dry up. Drinking water is generally obtained by sinking wells in suitable localities.* The running water has generally a taste which is not quite pleasant. The hill natives believe that the bad quality of their water during the hot months is the cause of the endemic fever which affects them at that season."† There is a considerable population permanently resident in the hills, consisting of a limited number of Europeans and half-castes, of coolies employed in the coffee plantations, &c., and of the Malayalies, the hill tribe of the range.

Entire failure of any contagionist doctrine to explain the facts regarding the immunity of the Shervaroys.

Epidemics of small-pox frequent.

Absence of some local condition or conditions necessary to the development of cholera.

Difficulties in the way of any explanation of the immunity by the water theories.

Water scarce and of bad quality during the dry weather.

33. It now remains to be considered how far, and in what way, the conditions under which they live can account for the immunity from cholera which they enjoy, and which, as far as information is attainable, has, up to the present time, been perfect. In the first place, all explanations of this fact founded on supposed isolation, and consequent non-exposure to the poison of cholera, may be set aside, as even more untenable than in the case of the Neilgherry plateau. We have here an area of such small size that isolation is prevented even more effectually than it could be in some parts of the Neilgherries; and there is a sufficiently large resident population to afford ample field for an epidemic to work upon, if for its production all that is required be the introduction of a poison from without. That such is the case is demonstrated by the frequent occurrence of epidemics of small-pox, and yet, although "for the last 40 years there has been a daily stream of human intercourse between the hills and Salem, the latter a town from which cholera is seldom or never absent, and though coolies have contracted cholera in Salem and died of the disease on the hills, yet it has never spread or assumed an epidemic form. Some conditions necessary to its propagation are evidently wanting. Its germs have been frequently introduced, but conditions necessary to their development have as yet been wanting." Thus Dr. Cornish wrote some years ago, and, as far as evidence goes, the conditions alluded to have continued in force until now. The purely contagionist explanation having thus failed to throw any light on the matter, we may now consider what the water and soil theories can suggest. Any theory which regards water as the *nidus* for the development and the means of diffusion of the cholera poison is, in a case like this, liable to almost precisely the same difficulties as the pure contagionist theory in affording satisfactory explanation of the existing exemption, seeing that it insists on isolation as the only effectual preventive; and in a locality like this, where the water-supply at certain times of the year is far from exceptionally good or free from liability to direct pollution, the difficulties which come in the way of such an explanation cannot be set aside. It cannot be urged that there is any unusual cleanliness among the coolies on the hills, and as regards the Malayalies, we are told that the vicinity of their huts "swarms with filth and exhales a putrid odour,"‡ so that it can hardly be supposed that they are more particular than the inhabitants of other places in their care to prevent the entrance of organic impurities into their drinking water, and this, as we have already noted, is in general scanty and of doubtful quality during the dry weather. This last point, when taken in connection with the existing exemption, appears decidedly adverse to the universal applicability of the other water theory, which supposes an outbreak of cholera to be the inevitable result of the introduction by human intercourse of a specific poison into any locality in which the water-supply is liable to contain organic impurities.

The soil theory meets the requirements of the case better.

34. The above theories being apparently incapable of affording a satisfactory explanation, it remains to be seen how far a theory which holds soil influences to be of paramount importance in the localization of cholera can account for the facts observed. That it does, in appearance at least, better meet the requirements of the case, there can be little doubt; for here, to an even greater extent than on the Neilgherry plateau, it is only on isolated spots that portions of soil furnishing the assumed conditions for liability can exist, and so long as the bulk of the human habitations are not situated in such spots there ought to be a general immunity.

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* For results of microscopic examination of samples of water, *vide* Note A., 27, 28.

† *The Shervaroy Hills*, by W. R. Cornish, Esq., F. R. C. S., Sanitary Commissioner for Madras.

‡ *An account of the Malayalies or Hill-men inhabiting the Shervaroy Hills*, by John Shortt, M. D., &c.

Importance of certain physical features of the Mysore country.

Nature of the soil.

Bunded tanks and other accumulations of water.

35. THE MYSORE COUNTRY.—The most important feature in this tract, as regards Pettenkofer's theory, is the extremely shallow nature of the soil, combined as it is with an undulating surface, which produces an endless series of shallow basins and troughs separated from one another by ridges of various magnitude. The basis of the country, as usual in the south of India, is composed of gneiss, which crops out through the thin soil in all directions, in some places forming smooth flattened surfaces, and in others rising into mounds or abrupt naked hills. The rocks of this basis vary greatly in appearance in different localities, in some showing very manifest foliation, and in others being hardly distinguishable from granite. They vary also in the amount of disintegration which they have undergone; for while in many places they appear hard and unaffected even on the surface, in others they are softened, disintegrated, and fissured to various depths. The soil superimposed on this basis is in general red, porous, and full of fragments of the disintegrating rock, into which it often passes by almost insensible gradations. In many places it is only a few inches in thickness, but in others it has accumulated considerable thickness, and attained a depth which permits of trees flourishing and attaining dimensions much greater than those which they present over the country in general. Some of these hollows are, however, very deficient in soil, and show exposed rock surfaces. The hollows, whether bare or soil-covered, frequently contain accumulations of water, retained either by the natural contour of the surface, or, as is far more generally the case, by bunds obstructing the line of drainage.

Villages generally in the hollows.

36. These bunded tanks abound everywhere, and are of very great importance to the agriculturist, as, in a country like Mysore, if there were no means of storing water to a large extent, the small rainfall and the general nature of the soil and surface would inevitably result in the production of extreme dryness during a great part of the year. Immediately below the bund of the tanks there are usually patches of ground under wet cultivation. The villages are generally situated in the immediate proximity for convenience in procuring water for irrigation and drinking purposes, and because the natives believe that by living in the hollows they are less liable to suffer from malaria than they would be were their houses placed on the elevated portions of ground.

Important influence exerted by these bunded surface tanks on conditions of soil moisture in their neighbourhood.

Reasons for this influence.

Great seasonal variations in the amount of water in such tanks.

37. These bunded tanks must, from their very nature, exert an important influence on the conditions of soil moisture in their neighbourhood, an influence entirely different from that of any mere puddled or stone-lined excavation in which water is accumulated, and must artificially induce a state of things not naturally proper to the locality. The bund in obstructing the natural line of drainage and accumulating a body of water behind it, forces moisture and soil water backwards into the soil above, over an area varying with the lie of the surface and the height of the bund, an area which otherwise would in many instances be entirely and thoroughly drained to the exclusion of any accumulation of soil waters.—*Vide* Plate I, fig. 2. In this figure it is shown that in the area A there is an accumulation of soil moisture due to the height of the water in the bunded tank B, an accumulation which would not exist were the bund C removed and the water permitted to follow the natural line of drainage. The areas occupied by these tanks vary greatly at different times of the year, and many which at the close of the rains show a surface of water several miles in circumference, almost or entirely dry up during the hot weather.

Level of water in wells.

38. There are almost everywhere numerous wells, but the water in them is so frequently brackish as to be little used for drinking purposes where tank water is attainable, and not liable to any special source of pollution. The water-level in these wells is in general far removed from the surface, and deeply sunk into the rock. There are, however, a certain number of exceptional cases in which the water-level is superficial, and the well a mere excavation into the water-bearing soil of a hollow, or into the rock beneath it to a slight degree. Bearing these very general facts as to soil and water in mind, we have now to consider cholera in connection with them.

Is cholera endemic in the Mysore country?

39. Cholera is throughout the greater part of the Mysore country invariably introduced from without. Whether there is any part in which it is truly endemic is a matter of debate. But we find so high an authority as Dr. Balfour, in his Statistics of Cholera, classing the north part of Mysore among the endemic localities of Southern India. The rest of the country shows in general no special proclivity to cholera, and the disease, save in certain localities, is not of frequent occurrence. Its frequency in certain places appears, sometimes at least, to be closely related to the existence of special facilities in them for the introduction of the disease or its causes from without, and in such cases, anything which dimin-

ishes these facilities tends also to diminish attacks. The town of Collar is, as I am informed by Dr. Kirkpatrick, Surgeon to the Mysore Commission, an example of the truth of this statement. It is alleged that, since the opening of the Railway has diminished the great stream of traffic and pilgrims through the town, it has lost the special proclivity to cholera, for which it was formerly notorious.

Facts regarding Collar.

In such a country as Mysore there ought to be exempt localities.

But there are others possessing every condition of liability.

40. It seems to be supposed by some that the existence of cholera in an epidemic form, in a country with a soil like that of Mysore, is incompatible with the truth of Pettenkofer's theory, and there can be no doubt that in such a tract there must be numerous special localities presenting conditions which ought, according to the theory, to provide exemption from local development of the disease. This, however, can in no sense be asserted of the country as a whole. On the contrary, localities are everywhere present which have the precise characters favoring the existence of the conditions which are assumed to be essential to the local development of the imported cholera germ.

Universal contemporaneous liability cannot be expected.

General prevalence of cholera, according to the soil theory, should occur in a season of moisture in such a country as Mysore.

Facts agree with the *à priori* conclusions.

Possibility of localized outbreaks dependent on variations in soil conditions.

41. From the very shallow nature of the soil in general, the great variation in its amount in different places, the moderate rainfall, and the very unequal distribution of the rainfall water throughout the soil, we cannot suppose that at any given time uniform conditions of soil moisture prevail over continuous areas of any great extent; and we cannot, therefore, according to the soil theory, expect to find a universal prevalence of cholera at any particular season, as the meteorological conditions which will render one place liable will render another partially or totally exempt. From the generally distributed shallowness and dryness of soil, we ought to find cholera generally prevalent at a different time of year from that in which it prevails in alluvial or other kinds of porous soils which are highly charged with water; for it is plain that a continuance of dry weather, which would only reduce the amount of soil moisture in the latter, would so thoroughly dry the soil in many parts of the former as to render it unfit as a *nidus* for the supposed germs of cholera. Now the truth is that we do find the general prevalence of cholera throughout the Mysore country to be during a time of year when showers prevail, and a certain amount of soil moisture is kept up. On the other hand, in those places in which local accumulations of water are retained, whether by natural or artificial means, there must frequently be localized areas in which the soil at certain seasons is almost saturated, and is in fact in the condition of a shallow, water-logged, alluvial soil, so that with a general prevalence of the disease at one season, localized outbreaks may occur at almost any time, without necessarily implying any inconsistency in the soil theory.

Mysore affords an excellent field for observation on the soil theory.

42. The country, as a whole, presents an excellent field for observation from the numerous sharply defined differences in character and conditions of soil of the different areas throughout it. In the meantime, accurate data as to the exact localization of the disease at different times of year, in different places and in the different parts of the same place, are wanting, so that a definite judgment as to the bearing of the country with reference to the soil theory cannot be formed. What we do know is, that the general prevalence of cholera is during the showery weather of the south-west moonsoon, and this taken along with the prevailing soil-characters of the country cannot be regarded as otherwise than favorable to the soil theory as expounded by Professor Pettenkofer.

Localities visited in the Mysore country.

43. The localities visited in the Mysore country were Bangalore, Toomcoor, with some villages in the neighbourhood enjoying a reputation for immunity, and Clospett and Mysore Town as special cholera localities.

Rainfall at Bangalore.

44. BANGALORE.—This station has an elevation of 3,000 feet above sea level, a mean temperature of 75·4, and a rainfall of 25 inches. The rainfall is so very moderate because the existence of "the eastern and western hill ranges, distant 60 to 80 miles, tends to break the force of the monsoons, and although heavy showers are frequent, rain is rarely of long continuance, and by no means equal either in duration or intensity to the monsoon rains of the adjoining low-lying country of the Eastern or Western Coasts. The rainfall at Bangalore is so fairly distributed over the months from March to October inclusive, that even at the height of the hot weather, the cantonment continues to preserve its verdure little impaired."*

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* *Report on the Station, Barracks, and Hospitals of Bangalore,* by Robert S. Ellis, C. B., 1866.

Table showing the Monthly, Quarterly, Half-yearly, and Yearly Fall of Rain.*

MONTHS.			ONE YEAR. 1859.	Winter, Spring, Summer, and Autumn.	
			Inches.	Inches.	Inches.
January	...	...	0·1	0·1	4·1
February	...	...	...		
March	...	...	...		20·9
April	...	...	...	5·1	
May	...	...	1·3		
June	...	...	3·8		
July	...	...	1·6	12·6	
August	...	...	5·6		
September	...	...	5·4		
October	...	...	3·2	7·2	
November	...	...	1·1		
December	...	...	2·9		
Year	...		25·0	...	...

Nature of the soil.

45. There is little to be noted here regarding the soil of Bangalore, as it presents precisely those characters described previously as prevailing throughout the Mysore country, that is to say, it is very shallow, red, and gravelly, resting on a basis of hard rock which crops out on the surface in all directions. Here also the surface of the ground is undulating, consisting of a series of shallow basins and slight limiting elevations, the hollows being frequently occupied by bodies of water either freely exposed on the surface in natural and artificial tanks, or more or less concealed by soil, and only manifesting their presence in shallow surface wells. From the smallness of the rainfall, water is by no means abundant, and a really satisfactory source of drinking water appears to be still wanting. The tanks in the meantime are liable to a certain amount of pollution, and the water furnished by many of the wells is not only scanty but very brackish. The wells, with the exception of a few surface ones, are deeply sunk into the gneiss rock, and their water-levels are far removed from the surface of the ground. The one from which observations regarding Pettenkofer's theory have been derived, shows according to the returns a level varying from nearly 37 to a little above 40 feet from the surface; and it is hardly doubtful that very little information of any value can be hoped for from the observations recorded, seeing that it, in common with the other similar wells, cannot furnish any exact information regarding changes in the soil moisture above the rock. (*Vide* page 148.)

Water-supply.

Level of water in wells.

Frequency of cholera in Bangalore.

46. Cholera has frequently prevailed in Bangalore both among the troops and bazaar population. Dr. Balfour gives the following statistics regarding its occurrence among various bodies of troops during periods of time ranging from 8 to 12 years.

		Average Annual Ratio per 1,000 mean strength admitted.
H. M.'s Infantry, 1831-38	...	34·61
„ Hussars, 1830-38	...	13·16
„ Officers, 8 years	...	11·51
H. Co.'s Foot Artillery, 1830-34	...	9·00
„ Horse Artillery, 1829-1842	...	4·81

Existence of localities within the station appearing to furnish conditions unfavorable to the local development of cholera.

47. In considering the soil theory in reference to Bangalore, it must be admitted that, while there are many places which are evidently subject to the assumedly important conditions for liability, there are on the other hand very many others which, on a superficial examination at least, would appear to be so situated as to have a very great likelihood of immunity, if immunity be necessarily due to the absence of these conditions. Such being the case, until we have exact data regarding the precise local distribution

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* Extract from Appendix A. of same Report.

Consequent need of very accurate observations.

Facts regarding the normal seasonal occurrence of cholera.

Season of occurrence not that of greatest diminution and concentration of water-supply.

of the cases occurring in any epidemic with their relative times of occurrence, and of the soil conditions indicated by rainfall, &c., under which they occurred, it is useless to endeavour to draw definite conclusions regarding the extent to which the soil theory is here applicable. In the acquisition of such data, it should be carefully kept in view that it is evidence showing development from a local centre, and not of the mere occurrence of cases, that is mainly important. A certain number of isolated cases, due to the action of a poison acquired elsewhere, may, according to the theory, appear in any place. Regarding the general seasonal occurrence of the disease, Dr. Kirkpatrick, whose long experience in the Mysore country renders any information derived from him of special value, informs me that, as before mentioned regarding the country in general, cholera usually prevails in Bangalore in the months from May to September, that is, at a time when the shallow soil is frequently moistened by heavy showers. (*Vide* page 159). These showers may, no doubt, be regarded as of importance, not on account of the changes in soil moisture which they induce, but because of the pollution of the water-supply which they may induce by the in-washing of organic impurities, which may either, directly by poisoning or indirectly by predisposing, lead to a general diffusion of the disease. Still the fact remains that the general season of prevalence is not that in which the water-supply is most deficient, owing to the failure of the wells from continued drought, and consequently not that when the inhabitants are most dependent on the concentrated water of the tanks.*

Conclusions regarding the bearings of the chief cholera facts of the station on the soil theory.

Differences in the local rainfalls and cholera seasons of Madras and Bangalore compared.

48. The chief things to be noted regarding Bangalore appear to be shortly as follows:—*1st*, that the nature of the soil is such that the occurrence of cholera in the station is by no means inconsistent with the correctness of the soil theory; *2nd*, that the usual season for the occurrence of the disease, when taken in connection with the nature of the soil and distribution and amount of rainfall, seems rather to favor the soil theory, as showing a coincidence between changes in soil moisture and development of cholera, but that it cannot be said to favor it, to the exclusion of the water theories; *3rd*, the cholera season includes within it the months in which one of the two seasonal increases of cholera in Madras takes place; but, in as far as information goes, there is no decided tendency to a recurrence in the cold weather. On reference to the table of rainfall, however, it will be seen that there is no soil reason for a cold weather rise in Bangalore. Up to the beginning of October, the total rainfall of Madras and Bangalore does not differ much, being respectively 18·60 and 17·8; while from October to December inclusive, they are 29·22 and 7·12, and the resulting soil conditions are consequently very different in the two places, there being in Bangalore no saturation by excessive north-east monsoon rains, but a mere gradual transition to the complete dryness of the rainless months of the early part of the year; *4th*, from the nature of the soil on which the station lies, there are areas included within its limits which, according to the soil theory, ought to be exempt; *5th*, from the same cause the seasonal localization of the disease may be expected to vary, even within the limits of the station, different areas being affected in different years, and at different times in the same year.†

Toomcoor, Cora, and villages with a reputation for exemption.

49. Having through the kindness of Dr. Balfour been furnished with a list of villages in the Chittledroog Division of Mysore which have a reputation for exemption, it seemed advisable to visit some of them with a view to ascertain whether there are any physical peculiarities about them, more especially as by doing so an opportunity was furnished of seeing Toomcoor and Cora, both places which have frequently suffered severely from epidemics, and which therefore afford good fields for comparison with the reputed exempt areas in their neighbourhood.

Situation of Toomcoor.

50. TOOMCOOR.—The town of Toomcoor is situated on the road between Bangalore and Bellary, and at about 40 miles from the former station. There is nothing special to note regarding the soil, its characters being similar to those previously described as prevailing throughout the Mysore country. The greater part of the town occupies a somewhat elevated and undulating piece of ground, but a portion of it lies on low ground almost on a level with the water of a large tank situated immediately to the

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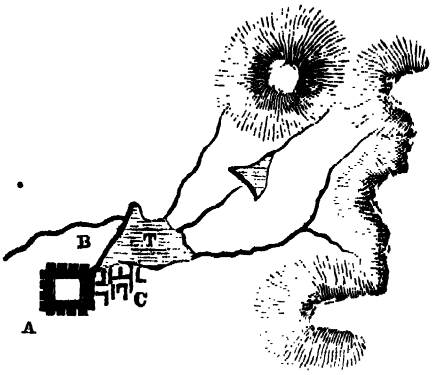
* Dr. Macpherson, in complaining of the state of the Alsoor tank in 1858, writes—"In short, all the filth and sewage of three-fourths of this large station is emptied into this tank which gives the sole supply of water to the entire population residing near it, as also to the soldiers who inhabit the barracks over it, the wells within their premises giving no supply whatever in the hot weather" Of course, the state of the tank has since then been improved, but the dearth of water continues.

† For microscopic characters of waters, *vide* Note A., 29, 30.

Large tank.

Water-supply.

northward. This tank receives the drainage of a range of hills to the north-east, the water being retained by means of a fine and long bund, which, extending from the slightly elevated ground near the town, and running parallel with the high road for some distance in a northerly direction, dams up the water against the higher ground. This tank when full is several miles in circumference, but during the hot weather it shrinks greatly, and occasionally even totally dries up. The water in it is employed in the irrigation of a piece of ground of considerable size on the further side of the road, and as a source of bathing water, but it is not used for drinking, at least not by the higher caste natives, as it is polluted by a village of chucklers situated on the bank opposite the bund. On the slope, at the town extremity of the bund, exposed rock surfaces crop out, but further to the right the slope of ground is not so abrupt or manifest, and here there are some low-lying houses of the town and numerous small gardens. The following rough diagram may serve to make the positions of the town, the tank, and the bund more readily understood than a mere description can do.



A.—*Town.*
C.—*Houses and gardens beyond the walls.*
T.—*Tank.* B.—*Bund.*

Water-levels of wells.

51. There are numerous wells in the town, the water-level in which varies considerably, as might be expected from the nature of the ground in which they are situated. The water-level in three of them was taken with the following results :—

Well.	Distance of water from surface of ground.		Depth of water.	
	Feet.	Inches.	Feet.	Inches.
1	4	2	9	8
2	6	6	12	0
3	11	6	16	4

No. 1 is situated in the soft ground near the large tank, and is much used by the natives of the lower part of the town, who state that, although its water-level varies greatly at different times of year, and though it becomes very low in the dry weather, yet it does not absolutely fail. Both the other wells are on the higher ground, No. 2 being that in the court of the native rest-house, and No. 3 at no great distance from it. The water in No. 1 and the wells in its neighbourhood sunk in the soft soil and showing a very superficial water-level, appeared manifestly to be a portion of the body of water retained by the bund, and shewing itself elsewhere on the surface in the tank. What the precise nature of the soil in Nos. 2 and 3 is could not be ascertained, as they were stone-lined beneath the water, but taking their levels into consideration, along with the fact that the surface of the ground rises slightly from No. 1 to No. 2, and from the latter to No. 3, it appears to be extremely probable that they owe their water, in great measure at least, to the same source, and that we have in Toomcoor an excellent example of the great modifying influence of a large surface bunded tank on the conditions of soil moisture in its neighbourhood.

Probability that the wells are mainly dependent on the tank.

Dietary of inhabitants.

52. The diet of the bulk of the inhabitants consists of dry grains, chiefly *ragi*, only the wealthier high caste people using rice.

Cholera facts of Toomcoor.

53. The district and town of Toomcoor have on various occasions suffered severely from epidemic cholera, the year 1869 being the most recent occasion on which it made its appearance. The Superintendent of the District, Major Burce, having kindly allowed me to consult the register of deaths, rainfall, &c., I subjoin the following results:—

Year.	Month.	Rain.	Cholera.
1864	May	6·82	Prevalent in end of April, May, and June; 425 deaths.
	June	7·70	
	July	6·32	
	August	13·21	
1865	January	...	Prevalent in June and July. This heavy fall mainly at the end of the month.
	February	...	
	March	...	
	April	2·13	
	May	5·21	
	June	4·50	
	July	10·12	
	August	4·84	
1866	January	...	Four thousand eight hundred and forty-four deaths. Cholera began to prevail in April and continued prevalent until October, when there was some abatement, but both cholera and fever continued to appear "until the end of November, when the early crops were reaped."
	February	...	
	March	...	
	April	2·36	
	May	1·87	
	June	0·73	
	July	2·90	
	August	2·50	
	September	4·64	
	October	18·46	
	November	...	
	December	5·70	
1867	......	...	No cholera.
1868	......	...	No cholera.
1869	January	...	Fifty-two deaths in May and June.
	February	...	
	March	...	
	April	0·6	
	May	2·94	
	June	3·34	
	July	4·98	
	August	12·18	
	September	3·44	
	October	3·71	
	November	0·68	
	December	...	

Cholera not a disease of the dry weather in the town and district of Toomcoor.

From this registry we find that cholera in the district and town of Toomcoor is a disease not of the dry weather, when the water-supply is lowest and most concentrated, and not of the periods following the heaviest rainfalls, such as might be supposed to provide special facilities for the in-washing of surface or soil-contained impurities, but of the early showery months of the rains. In 1866, when the heavy rainfall was delayed, cholera also persisted beyond its ordinary season; but very much stress cannot be laid on this, as the influence of famine was at this time also present, "the people having to eat refuse of pounded rice, leaves, &c.;" and the heavy rain of October did not cause immediate cessation. It is also worthy of note here that the cessation of cholera is registered as coinciding with the coming in of the new grain into the bazaars, and that in a part of the country like this, where the introduction of new grains and the cholera season do not happen to occur at the same times of year, no evil influence is ascribed to the former. It may be urged that it is only new rice which is supposed to be hurtful; but we have already seen that new dry grains at Salem are believed to be connected with the disease, where their introduction into the bazaar and the prevalence of cholera coincide in season.

Use of new grain not esteemed a cause of cholera by the natives in the Toomcoor district.

Coincidence of cholera with soil-moisture.

54. These data regarding cholera in Toomcoor are, of course, so imperfect and scanty that nothing definite can be founded on them; still they are worthy of note, because they seem to show the existence of a tendency here, as in Madras and Bangalore, to the coincidence of cholera prevalence, with a certain amount of moisture, and of a moisture which the Madras evidence tends to indicate as belonging to the soil, and not to the atmosphere. It may appear

Local rainfall a fair index of general conditions of soil-moisture in a country like Mysore,

but not in a region subject to river influences.

to be unwarrantable to place reliance on mere data of local rainfall as affording an index of soil-moisture, and certainly local rainfall is not a universally applicable or strictly accurate index; but in a country with a soil and surface like Mysore, while the special conditions prevailing in localized areas may not be capable of being ascertained from such data, they must at least afford general information. The case is very different in localities where, as for instance in the delta of the Cauvery, a complete system of irrigation distributes river water throughout the soil, and where consequently the amount of soil moisture is as much, if not more, dependent on the rain of the regions drained by the river as on its own local fall.

General conclusions.

55. The points of main importance to be noted regarding Toomcoor are,—*1st*, the cholera season is a season characterised by a certain amount of moisture, *2nd;* that the large tank must from its position exert a most important influence on the soil-moisture of part of the town; *3rd*, that from the variations in the soil on which the town is built, there ought, according to the soil theory, to be variations in the degree of liability of different parts of it, so that accurate notes of the localization of cases are indispensable before definite conclusions as to the applicability of the theory can be obtained.*

Situation of Cora.

Large surface tank.

Level of water in the tank.

56. CORA.—This place, a former halting ground for troops, and a noted cholera locality, is situated six miles north from Toomcoor on the Bellary road, which passes within a short distance to the left of it. Like all the villages and small towns in this district, it is surrounded by a high mud wall, within which the houses are irregularly crowded together. It occupies the lower part of a gentle slope rising from the bund of a large surface tank situated to the northward. Between the bund of the tank and the northern wall of the village, the road leading from the high road to the gate entrance passes, while immediately outside the wall is a shallow ditch, so that there are three lines parallel to one another and at different levels,—*1st*, the tank bund, highest; *2nd*, the road below the level of the top of the bund; *3rd*, the ditch innermost and lowest. When the tank is full, the level of the water in it is above the level of the road. This was the case in December 1870, and at that time there was also a certain amount of water in the ditch beneath the village wall.

Sanitary condition of the village population.

57. The interior of the village, although untidy-looking, from the irregular arrangement of the houses, is by no means dirty, no doubt mainly because the sloping nature of the ground which it occupies allows of the easy removal of rubbish, &c. The houses are said to be 150, and the inhabitants above 1,000 in number.

Wells and their water-levels.

Differences in conditions here as compared with those prevailing at Toomcoor.

Cora is a locality furnishing those conditions which, according to the soil theory, are favorable to the local development of cholera.

58. There are several wells within the walls, but the water contained in them is only used in bathing and washing, as its brackishness renders it inferior for drinking to that in the tank. One of these wells which had been excavated during the current year was examined. The water-level in it was 10 feet from the surface, and the owner asserted that no rock or hard soil had been encountered in digging it; that the water was really in the soft soil appeared to be confirmed by the fact that the sides of the well were lined with earthenware cylinders, as is usual in such cases. A neighbouring well of older date showed water at about the same level, and was reputed to dry up in the hot weather. It is almost impossible to doubt that these wells, with such superficial water-level, and excavated in apparently soft soil on a piece of ground sloping to the bund of a surface tank, are in reality, as we previously found to be the case at Toomcoor, dependent in great part on the accumulated water of the tank. The cases differ, however, in this—that while at Toomcoor the water in the wells is due to the tank, by obstructing the line of drainage, forcing moisture back into the soil, at Cora it is seemingly due to gradual percolation through or beneath the bund. In Cora we have a place with a reputation for liability to cholera coincident with the existence in it of those soil conditions which, according to the soil theory, are favorable to the development of the cholera poison; for we find in it a soil permeated by a superficial and fluctuating body of water (the wells at all events positively showing this to be the case, whether due to the influence of the tank or otherwise).

Absence of data of season of occurrence.

59. Exact data as to the seasonal occurrence of cholera in Cora are not attainable, but we have previously seen that the early part of the rains is the season for general prevalence throughout the district (*vide* p. 162), and there is nothing to show that Cora is in any way exceptional. If the early part of the rains really is the normal season for prevalence, there may appear

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* For results of microscopic examination of the tank water, *vide* Note A., 31.

to be more in favor of the water theories here than at Toomcoor, as the inhabitants are dependent for drinking water on the tank, which is more liable to the in-washing of surface impurities than the wells at Toomcoor; but it must be borne in mind that surface drainage from the village is little likely to enter the tank from the relative position of the former to the bund, while for the same reason water from the tank is very likely to enter the soil of the village.[*]

No special facilities for in-washing of impurities into the tank.

Names of reputedly exempt villages.

60. The reputedly exempt villages visited were three in number, *viz.*, Timmarajanahully, Linganhully, and Tappad Begoor. It is of importance to bear clearly in mind that, in regard to any such instances of reputed exemption, there are frequently two sources of fallacy present, which necessarily deprive observations regarding the existing local soil conditions of much of their value. These fallacies are,—1*st*, one common to localities in any district, whether prone to cholera or otherwise, *viz.*, that native testimony alone is of little value; and 2*nd*, one which is most important in the eyes of those who do not believe in the doctrine of the general diffusion of cholera by atmospheric agency, *viz.*, that in districts or countries in which, as in Mysore, cholera appears so much as a disease resulting from the introduction of a cause from without, isolated spots out of the general line of traffic may, up to the present time, have really enjoyed an exemption, but an exemption due not to any local conditions, inhibitory to the development of the disease, but only to non-introduction of the material to be developed. This latter fallacy increases inversely with the size of the exempt localities if similarly situated, but at the same time a place even of considerable size is of much less importance as an example of immunity, if it be situated so as to have small liability to introduction of the disease than a much smaller place is, if situated in any great line of traffic, and consequently of liability to such introduction. These sources of fallacy being in the meantime unavoidable, all that can be done is to examine the existing physical conditions in any reputedly exempt locality, in order to ascertain how far they correspond with those supposed by the soil theory to be influential in conferring immunity, recollecting that even if they appear thoroughly conformable, it still remains a matter of uncertainty whether the exemption be an actual fact, and how far it is a fact solely explicable by the soil theory.

Sources of fallacies in connection with such localities.

Situation of Timmarajanahully.

61. TIMMARAJANAHULLY.—This small cluster of houses is reputed to have always enjoyed an exemption from cholera. It is situated on the Bellary road, ten miles beyond Toomcoor and four miles from Cora, both of which we have already seen to be cholera localities. The houses are, as usual, enclosed by a mud wall, the door of which opens directly upon the road; within the wall there are only nine houses with a population of thirty. The two nearest villages are situated respectively at one and two miles distance; neither of them are on the road; the nearest, Linganhully, has also a reputation for immunity; the other is said to be subject to cholera.

Nature of the soil.

62. The part of the country in which Timmarajanahully is situated is high and open, and the surfaces of the ground irregular, forming a series of small elevations, between which are hollows frequently occupied by shallow, sandy water-courses. The soil presents a maximum of shallowness, is of the usual red porous character full, of fragments of stone, and broken in all directions by bare surfaces of rock in various stages of hardness or disintegration. The sides of the water-courses, though rarely more than a foot in section, showed almost everywhere exposed rock, which in such situations was frequently very soft.

In some of the water-courses, although when visited they showed surfaces of perfectly dry sand, yet water was to be met with on digging downwards into this for a few inches. The village occupies the side of one of the elevations, and the ground slopes from it in three directions, in front to one side and to the back.

Water-supply.

63. The only well or source of water-supply in the neighbourhood is situated several hundred yards from the village, and due to the slope of the ground at a lower level than it. The water-level in it was in December 1870 at eight feet from the surface.

64. Even putting the question of the untrustworthiness of native evidence aside, the village, were it situated otherwise than it is, would, from its small size and scanty population, be hardly worth consideration; but, standing as it does immediately on the Bellary road, a great cholera thoroughfare, it is, in spite of its size, a noteworthy place. The general soil conditions would certainly appear to warrant exemption according to Professor Pettenkofer's views; for, from the character of the ground and general configuration of the surface, it is very improbable that water can lodge and accumulate in the soil beneath and immediately around the village, as the general drainage into the surrounding

Soil conditions such as ought to favor immunity according to the soil theory.

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[1] For microscopic examination of the water of the tank, *vide* Note A., 32.

hollows must be rapid and perfect. At the same time, it must be allowed that local accumulation of soil-moisture may occur, even in a locality with a general sloping surface, and also that the well is at some distance from the village, and out of thedir ect line of drainage and liability to contamination.*

Well free from liability to contamination.

Situation of Linganhully.

65. **Linganhully.**—This is situated about a mile to the right of the road on the summit of an elevation contiguous to that on which Timmarajanahully stands, and separated from it by a hollow which is, as usual, occupied by a water-course. The ground slopes gently from the village, but not so much or in so many directions as from Timmarajanahully, and on the slope weathered and disintegrating rock crops out in abundance. The houses, twenty in number, are enclosed within the usual four square mud walls, and the inhabitants are said to be from 80 to 100.

Number of houses and population.

Water-supply.

66. The water-supply of the village is furnished by an open surface well situated in a hollow about half a mile distant. It is a shallow unwalled excavation in the soft soil, and contained when visited about five feet of water, the level of which was within four feet of the surface. It dries up during the hot weather, and water is then obtained by excavating in its bed.

Water peculiarly liable to assumedly important concentration of organic impurities.

67. The conditions of soil prevailing here so closely resemble those at Timmarajanahully that their influence must be identical, and unfortunately the sources of fallacy are equally present, the only difference between the two places being the fact that here the source of water-supply, although well removed from the village, is of that open, exposed, failing character which is frequently indicated as ensuring the organic contamination assumedly so important in favoring the development of cholera.†

Situation of Begoor.

68. **Tappad Begoor.**—This village is situated twenty-three milles from Bangalore, and about half a mile to the west of Toomcoor road. It occupies a slight rising ground separated from the road by a broad shallow depression. Immediately to the north of the village this depression is crossed by a bund which by retaining the surface drainage converts the upper part of the low ground into a broad shallow tank (*vide* diagram, p. 166). The ground below the bund and in front of the village is under wet cultivation, being irrigated from the tank in the usual way. The ground on which the houses are situated slopes in front to the cultivated hollow between them and the road, and also to the northwards to the level of the water in the tank, and on the latter slope the gneiss rock crops out on the surface.

Tank.

Nature of soil.

69. An excavation about twelve feet deep in this slope showed a soil of the following nature:—the surface was very thin, composed of the usual porous red material, and resting on a subsoil of disintegrating rock. The upper part of this subsoil was very soft, but its consistence increased with the depth, until towards the bottom of the section a layer was reached composed of pure white rock, very dense and hard to excavate, but still more or less disintegrated and softened. This layer was somewhat moist.

Number of houses and inhabitants.

70. The number of houses in the village is above one hundred, and there are said to be eight hundred inhabitants. Their diet is, as usual in this part of the country, mainly composed of *ragi.* They obtain their drinking water from a well close to the side of the tank. When visited its water-level was at five feet from the surface, *i. e.*, the same as that of the adjoining tank. Although to all appearance closely connected with the tank, and like it mainly dependent on the bund, it does not like the former dry up entirely during the hot weather, but continues to be the source of drinking water throughout the whole year. Even in December the tank showed distinct evidence of a rapid process of diminution in area, broad margins of recently uncovered mud being exposed all around it in various stages of drying.

Water-supply.

Evidence regarding immunity.

71. This village, like the two previously considered, enjoys a reputation for immunity, a reputation which Dr. Kirkpatrick informed me appeared to be founded on more trustworthy evidence than that in regard to any other such locality that he was acquainted with. He also said that he had been positively and credibly informed of more than one occasion in which, while cholera was prevailing in the neighbouring villages, Tappad Begoor remained free. The headman of the village, on enquiry, stated that the only cases which had occurred within his experience were in the persons of two children who died ten years ago; but of course little reliance can be placed on such evidence. The same objections to the value of this example—an example of immunity which, if true, is very accordant with the axioms of the soil theory—apply as in the cases of the former "exempt" villages, and the point of main interest in regard to it lies in the close proximity, of the village to the tank, and its soil relations towards it. We have previously seen that, in the cases of Toomcoor and Cora,

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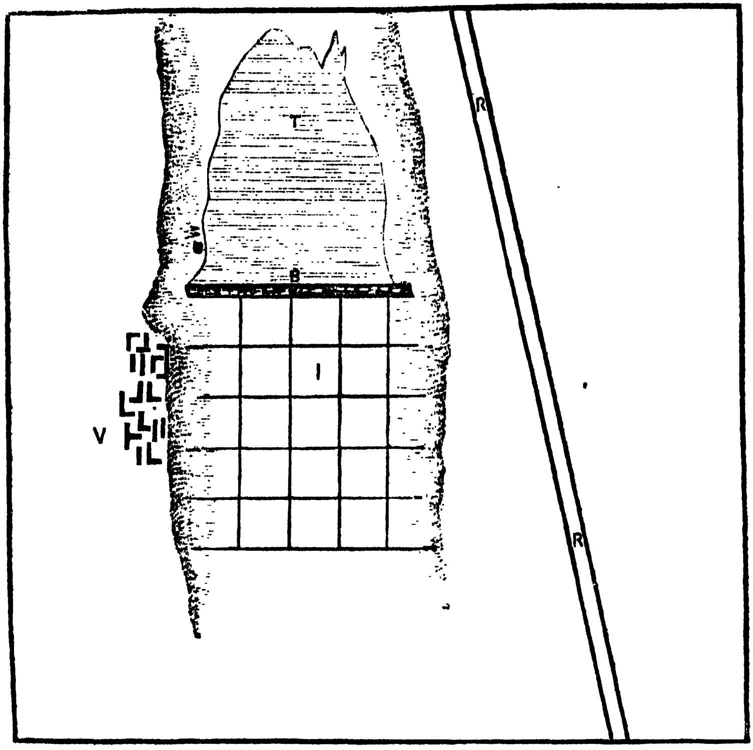
* For microscopic characters of the well water, *vide* Note A., 33.

† For microscopic characters of water, *vide* Note A., 34.

Importance of relative positions of tank and village.

the neighbouring tanks are so situated as to induce those conditions of fluctuating soil-moisture which render them liable, on the soil theory, to the development of cholera within them; but here, although the village is almost as close to the tank as in the former instances, it is yet so situated relatively to it that the local accumulation of water retained by the bund can hardly by any possibility influence its soil conditions in any way, for from its position beyond the bund, the latter cannot force back water into the soil beneath it, and any water permeating the bund must simply drain into the hollow in front, and follow the line of drainage which it would naturally have assumed had there been no artificial retention of it in the tank.—*Vide* diagram.*



R. Road.
V. – *Village.*
T.—*Tank.*
B.—*Bund.*
I. *Irrigated ground.*
W.—*Well.*

Situation of Clospett.

72. CLOSPETT.—This town has at the present time the reputation of being one of those most prone to cholera throughout the whole of the Mysore country, the disease seldom during the course of any season appearing elsewhere without visiting it. It is situated on the eastern bank of the Arkavutty river, and the high road from Bangalore to Mysore traverses it. The river here, in its course southwards to the Cauvery, passes through a narrow valley bounded on either side by bare rocky hills, which a little beyond the town close in so as to force the river to curve round to the east in order to obtain a passage. At Clospett the river bed is broad, shallow, and sandy, with here and there an exposed surface of rock. At the close of the rains it is filled by water, but the amount of this very rapidly diminishes, and after a few months it becomes totally dried up. In December 1870, in spite of the abundant rain of the north-east monsoon, the greater part of the bed was occupied by dry sand, through which separate streams of very clear water were passing in a tolerably rapid current. The dryness of the sand was however quite superficial, as water appeared whenever an excavation was made to the depth of a few inches.

Nature of river bed.

Nature of ground occupied by the town.

73. The town occupies a portion of ground which passes backwards from the river, almost level with the bank for some distance, and then rises abruptly towards the hills. On the opposite or western bank the ground rises at once from the river, and here a few native houses and the traveller's bungalow are situated. On the slopes on either side of the river, rock crops out here and there on the surface, as for example near the cutcherry on the eastern, and near the public bungalow on the western side.

Wells and their water-levels.

74. There are numerous wells within the town, and these, as is natural from the variations in the nature of the soil, differ much in character, according as they are situated on the higher or lower ground.

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* For microscopic characters of the well water, *vide* Note A., 35.

The water-level of two, one in the low ground, the other on the slope, was measured with the following results:—

Well.	*Water level.* Feet.
No. 1 ...	... 14
„ 2 ...	... 40

Well No. 1 was said by the natives to be sunk in soft soil, and was lined with earthenware cylinders. The water in it does not fail.

Presence of two distinct soil areas.

No. 2. This is situated within the enclosure of the mosque in the highest part of the town. The natives stated that blasting was necessary in its excavation, and that the water in it fails in dry seasons. Other wells in corresponding portions of the town seemed to be of similar nature, and confirmed the evidence derivable from the surface of the ground indicative of the existence of two very distinct soil areas. The first of these, composed of sandy soil, lies close to the river, passing backwards from the bank to the sloping ground, and is apparently permeated by a body of water continuous with that in the river. The second occupies the higher sloping ground, and is composed of a thin layer of red soil superimposed on a sloping basis of rock. In this there can be no general body of soil water, as any accumulation over a large area must be prevented by rapid drainage into the lower ground.

Water-supply.

Fever ascribed to use of river water.

75. The water contained in the wells of both areas is little used for drinking or cooking, owing to its brackish nature. Water for these purposes is derived from the river, and when the latter fails, from excavations in the sand of its bed. In spite of the great seeming purity of this water, and the sandy nature of the bed which it occupies, the natives do not consider it of wholesome quality, and ascribe the fevers to which they are very subject at certain times of year to its use. This is the more curious, as in other parts of the Mysore country we find a prevalent belief which regards river water as invariably wholesome when occupying a sandy bed, and only as deleterious when in a rocky one, as in the Cauvery at Seringapatam.

Number of inhabitants and nature of their diet.

76. The inhabitants of Clospett are said to be between five and six thousand in number, and, as usual, the staple article of diet is *ragi*.*

Data regarding localization of cholera unattainable.

77. We have in Clospett an example of a place peculiarly prone to cholera, and within the limits of which we ought, according to the soil theory, to find very marked differences in degree of liability in different areas; for the soil in the lower portion of the town manifestly furnishes the assumedly important conditions for development of the disease, while that in the upper can hardly do so unless to an extremely partial extent, the general drainage being necessarily perfect, and only very localized accumulations of soil-moisture being possible. Unfortunately, definite information regarding the localization of the disease is not as yet attainable. There is not a single European resident in the place, and even had there been, it is very probable that information as to the precise localization of cases might not have been forthcoming, mere localization, independent of questions regarding communication, being not in general considered noteworthy. The only information at all throwing any light on the matter was contained in the books kept by the native officials of the place, in which it was noted that "cholera prevailed at Clospett during the whole of September 1870, mostly at Bargeer Mohalla, on the river side." Bargeer Mohâlla constitutes a considerable portion of the town situated on the lower soil area, that area in which, according to the soil theory, the liability is strongly existent.

General liability of Clospett accordant with the soil theory.

78. Of course with such deficiency in data, any conclusions as to the exact bearing of Clospett on the soil theory are entirely out of the question, and the most important things to be noted in the meantime are—1*st*, that the general liability of Clospett is quite accordant with the soil theory; and 2*nd*, that the place appears to furnish a most valuable field for observations on the occurrence of future epidemics, as it is very seldom that such sharply-defined differences in soil conditions are to be met with within such a narrow compass, and in a place with a general proclivity to cholera. Exact information as to the localization of the disease is here free from many of the sources of fallacy connected with water-supply, as one source of drinking water is common to the whole town.†

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* This is stored in pits, and is said, when kept too long so stored, occasionally to acquire deleterious properties, becoming at the same time of a dark or black color.

It appears to be a current belief throughout the Mysore country that *ragi* does occasionally become poisonous, but the natives clearly distinguish between the symptoms said to be induced by the use of such grains and those of cholera, and have in general no tendency to ascribe the latter to such a cause. I was informed by an Apothecary who had had long experience in Mysore that the symptoms induced by bad *ragi* were quite characteristic, and that he himself had seen several rapidly fatal cases. All endeavours to procure specimens of this deteriorated grain were unavailing, as the bazaar people were naturally unwilling to allow that they had any in their possession.

† For microscopic characters of the river water, *vide* Note A., 36.

Situation of Mysore town.

79. MYSORE.—The town of Mysore occupies a basin-like hollow at the northern base of Charmandi Hill, one of the bare rocky elevations so common throughout, and characteristic of, the Mysore country. This hollow is bounded on all sides, save the west, by elevated ground, and is so deep as to effectually conceal the town, even at a very short distance, so that it is only when the bounding ridge is reached that the existence of a large town is ascertained.

Large tank.

On the west side, and close to the foot of the hill, is a portion of low ground through which the drainage of the hollow would escape were it not for the existence of a large bund which retains the water descending from the higher ground and, by its accumulation, forms a very large tank.

Nature of soil.

80. The soil is of the same nature previously described as prevailing elsewhere, being red, porous, stony, very thin, and much broken by outcropping rock. The drainage from the town and the general surface drainage of the hollow passes into the large tank, which is polluted to such a degree by this, and by being employed as a place for bathing and washing animals, &c., that its water is quite unfit for drinking purposes, even in the eyes of the natives,* who, although excellent judges of the quality of waters, are not always very careful as to the purity of that which they employ. The streets of the town occupy the ground sloping from the summit of the surrounding elevation to the level of the large tank, and one large suburb is situated on a low-lying area close to the tank on the side opposite to the bund.

Wells and water-supply.

Karrangie tank.

Poorniah's channel.

81. Throughout the town there are numerous wells, the water-levels in which are very different in different localities. In very many the water is thirty to forty feet from the surface, and deep in the subsoil rock; in others, on the other hand, which are situated in the lower parts of the town, it is quite superficial. The well-water is little used for drinking, as in most instances it is very brackish. Those of the inhabitants who can afford to do so, send for their water to the Karrangie tank, which is a tank of small size situated on the higher ground a little to the east of the town, and owing its water mainly to the drainage from Charmandi Hill intercepted in its course to the lower part of the basin, and conducted by a channel to this spot. Those who cannot afford to send to this tank, obtain water from certain wells which are not brackish, from various small tanks in other parts of the town, and from some springs in Poorniah's nullah. This nullah is a deeply excavated channel which traverses the town, and was intended to bring water from the Cauvery. Owing, however, to faulty levels, it cannot do this, and is now, save where the springs previously alluded to exist, a mere reservoir for stagnant water.† The sides of it afford excellent sections of the structure of the ground, showing the thin upper layer of red soil, and the irregular outlines of the disintegrating rock beneath.

Dietary of inhabitants.

82. The poorer inhabitants subsist mainly on *ragi*, the rich on rice, of which there is considerable cultivation in the irrigated area around Seringapatam.

Cholera, a disease of showery weather.

Data of local distribution wanting.

Conditions of soil-moisture cannot be uniform throughout the whole town.

83. Mysore has frequently suffered from severe epidemics of cholera, although for the last few years it has remained exempt.‡ Dr. Houston, who has had a long local experience, informed me that, as a general rule, the season for the occurrence of the disease is in April and May, during the early showers of the south-west monsoon, and that it appeared to him that an unusually dry season gave an additional chance of exemption. There are no accurate data regarding the local distribution of the disease, but the general impression appears to be that it pervades the town throughout, and I was even shown one place in the higher part of the town which was said by the Municipal Overseer to have formerly been specially liable. This latter piece of information was not, however, confirmed by Dr. Houston, so that no special importance can be attached to it. The deficiency of recorded data is much to be regretted, for if cholera could be distinctly shown to prevail equally, and at the same time, in the upper and lower parts of the town, it would be necessary to look for some other explanation of the phenomena, than the existence of a particular soil condition, it being hardly possible either that the two portions should be equally subject to soil conditions favoring the development of the elements of the disease, or that the soil conditions prevailing in them at any given time should be the same. In the greater part of the area occupied by the upper portion of the town, the lie of the ground and nature of the soil can only allow of very partial accumulations of soil-moisture, the general drainage being rapid and complete; while on the other hand the greater part of the

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* They believe that, although unfit for ordinary use, it possesses medicinal virtues, especially in the treatment of spleen cases. These virtues are, it appears, supposed to arise from the amount of elephant's dung which it contains.

† The people who derive their drinking water from these springs are said to be subject to Guinea-worm, while the rest of the inhabitants are exempt from this parasite.

‡ Since the above was written, notices of the prevalence of cholera in Mysore in 1871 have appeared.

lower area near the large tank, and situated so as to receive the drainage from the higher ground, must be subject to accumulation of organic matter and to great fluctuations in the amount of moisture in its soil, and ought therefore, according to the soil theory, to favor the development of the cholera poison to a much greater degree than the higher area can do.

The lower portions ought to be more liable than the higher.

In Mysore, as in Bangalore and Toomcoor, we find cholera to be a disease not of the dry weather, but occurring coincidently, with showers, which showers must inevitably alter the conditions of soil-moisture, but which can hardly be supposed to exert any very important influence in polluting the drinking water, as the drainage of the surface and soil of the town passes almost entirely into a tank which is not employed as a source of drinking water, unless in emergencies in which, due to unusual continuance of dry weather, there is a general failure of water.

84. In connection with the cholera facts of Mysore, it is most important to note that in the immediate neighbourhood of the town, but elevated above it to the height of nearly 1,000 feet by the abrupt ascent of Charmaudi Hill, there is a pagoda village which is generally reputed among the natives as enjoying an exemption from the disease. This village is situated at one extremity of the long narrow ridge which forms the summit of the hill, and the ground falls abruptly from it on three sides. There is here hardly any soil over the rock forming the basis of the hill, and this rock is very little disintegrated, as any softened portions, instead of remaining *in situ*, are rapidly washed down into the surrounding low ground. It is scarcely conceivable that there should be any accumulation of water or of organic impurities in the soil on which the village is situated, as the rain-water immediately drains downwards on either side into two small hollows about 100 feet below the level of the village, in which it accumulates, forming two small ponds. The larger of these lies on the southern slope of the hill, and from it the villagers derive their drinking water; the quality of the latter, in as far as microscopic evidence goes, is anything but pure (*vide* Note A), as indeed might be expected from the proximity of the tank to the village, and the facilities for the entrance of drainage impurities into it. The water in the other hollow is apparently employed to irrigate the few small patches of cultivated ground belonging to the village, in which a scanty vegetation struggles to exist on a minimum of soil.

Reputed exemption of pagoda village on Charmaudi.

Nature of soil on which the village is situated.

Water-supply.

The inhabitants are said to be about 700 in number. Owing to the existence of the pagoda, a favorite object for pilgrimages, and the fact that all food and bazaar supplies must be brought up from Mysore, there is necessarily a constant stream of intercourse going to, and coming from, the latter place.

Number of inhabitants.

Constant intercourse with the low country.

85. In regard to the occurrence of cholera, the natives by no means deny that cases have occurred on the top of the hill, as they would be likely to do, if only desirous of increasing the reputation of their pagoda, but merely assert that the disease never developes itself here as from a local centre. They freely allow that cases do occasionally occur in persons coming up from Mysore, whether natives of that town or of the village; that is to say, they admit the occurrence of imported cases, but deny the occurrence of locally originating ones. Unfortunately no further information can be obtained; all that could be learnt in Mysore being that there was certainly a widely-spread belief in the exemption of the village. Dr. Houston distinctly remembered that on one occasion, while living in the sanitarium bungalow on the top of the hill, he was applied to by the villagers for cholera medicine, but without information whether for cases derived from Mysore or locally originated. It is particularly to be regretted that accurate data are not attainable, as the locality appears fitted to afford an almost crucial test of the universal applicability of the soil theory as developed by Professor Pettenkofer, as well as to furnish most important evidence either favorable or adverse to the water theories, and it is most desirable that in the event of cholera again prevailing in Mysore, attention should be specially directed to the phenomena presented by this village.*

Reputation of exemption only as regards local development.

This village well suited to test the universal applicability of the soil theory.

86. Tanjore.—The town of Tanjore is situated in the district of the same name, which comprises the greater portion of the delta of the Cauvery. It occupies the extreme apex of a spur of somewhat elevated ground, which runs inwards from the south-west, and gradually subsides to the level of the alluvial plain. At Tanjore this spur is composed of a porous grit, generally of a yellowish color, which is covered by a layer of red earth, containing much laterite gravel, and here and there sheets and masses of the same material of such hard compact consistence as to form useful building stone.

Situation of Tanjore.

Nature of the soil.

87. The alluvium of the delta is everywhere traversed by irrigation channels which distribute the water of the Cauvery throughout the whole area, and impart to it that extreme fertility for which it is famous. As this distribution of the water has a very important

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* For microscopic characters of waters in Mysore, *vide* Note A., 37—40.

bearing on the conditions of soil-moisture of the district, it is very essential that it should be distinctly borne in mind. It is primarily regulated by the two main anicuts "at the north and south ends of the island of Sreerungum close to Trichinopoly," where the Cauvery first divides into its two principal channels, the larger of which, pursuing a tolerably straight course, reaches the sea as a considerable river, while the Cauvery follows a devious line through the delta, and feeding numerous channels as it proceeds gradually diminishes in size.

Distribution of the water of the Cauvery by irrigation channels.

Soil-moisture more dependent on the river than on the local rainfall.

Height of river not necessarily coincident with abundant rainfall.

Rivers dependent on melting snows as compared with those due to rainfall.

Two rises and two subsidences of the Cauvery.

88. In any tract of country such as this, in which irrigation is so thoroughly carried out, it appears almost necessarily to follow that the general conditions of soil-moisture existing at any given time are regulated very much more by the amount of water coming down to it from the regions, drained by the river, and dependent on the rainfall of those regions than on the mere local rainfall. If this be the case, in default of actual positive determinations of soil-moisture, we must, in endeavouring to acquire general ideas as to the prevailing conditions, take the main facts in regard to the river in connection with the local rainfall, for the former may indicate a high degree of soil-moisture at the very time that the latter would indicate the contrary, so that it is only by combining the evidence of both that any true estimate can be formed. A river like the Cauvery, arising in hills of moderate elevation, is necessarily affected by seasonal influences in a very different way from one which, like the great rivers of Northern India, takes its origin in snowy ranges, for hot dry weather in the drainage area of the former will cause a diminished flow in the river, while in the latter it will, due to the increased melting of the snow, cause a precisely opposite result. The amount of water in the Cauvery is then entirely dependent on the rainfall in Coorg, Mysore, the Neilgherry plateau, and the other hilly regions in which its tributaries arise, and the result is that the river "fills in the months of June and July by the south-west monsoon, when the water descends from the mountainous regions, and again in November by the north-east monsoon,"* so that there are two periods of rise and two of subsidence, the subsidence between the south-west and north-east monsoons being naturally small in comparison with that between the north-east and south-west monsoons.

and therefore, according to the soil theory, there ought to be two periods of special liability.

Extent to which facts agree with these *à priori* conclusions.

Principal season for cholera is the dry weather of the north-east monsoon.

89. We have then in the Cauvery delta a moist alluvial area in which two distinct subsidences of soil-moisture regularly take place, one of which is more considerable and prolonged than the other, and we should, according to the soil theory, expect to find two periods of cholera prevalence, one of more constant occurrence and greater importance than the other. If we now turn to the actual facts regarding the prevalence of cholera in the district, we find that there is at least a certain amount of coincidence between them, and the *à priori* conclusions of the soil theory, for we find, *1st*, that "Trichinopoly and Tanjore are generally most severely attacked in the season of the north-east monsoon;" and *2nd*, that in the year 1869 cholera prevailed in Tanjore town "in August, September, and October, and again in December."† Very much stress cannot be laid on the latter fact, which appears to coincide so perfectly with the requirements of the theory, as in other parts of the district we find it noted as prevailing in "November and December," and "from September to the end of the year;" and, in default of actual knowledge of the localities in which such was the case, it is impossible to determine whether there may not be local reasons for variation. At all events we have the broad general fact that in this area the principal season of cholera prevalence coincides with that of main subsident fluctuation in soil-moisture, and the occurrence of exceptions merely points out the importance of accurate investigation of the local conditions coincident with them.

Cholera of moist regions in dry season, of dry regions in moist season.

90. In connection with this, it is noteworthy that in this moist alluvial area in the south of India, as in the lowest part of the Ganges valley, we have cholera prevailing chiefly in the dry season, while in Mysore and the districts to the north of the Cauvery, as in the districts above the Ganges delta, we find it prevailing during the moist weather of the south-west monsoon. We have two widely separated areas of prevalence in the dry season of the year, and two areas of prevalence in the moist season. That the seasonal conditions for prevalence should be reversed for districts so very distinct in characters of soil as the delta of the Cauvery and the Mysore country are, is plainly in accordance with the views of Professor Pettenkofer, but it is not so easy to trace the same accordance in the case of the Ganges delta and the deep soils of Upper India. Still the fact remains, that in two areas with a moist soil cholera is a disease of the dry weather, while in two with a very dry soil it is a disease of the rains.

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* Macpherson.

† *Report on Cholera in Southern India, for the year* 1869, by the Sanitary Commissioner for Madras.

Is Tanjore subject to the conditions of the alluvial soil?

Water-levels of wells.

91. In regard to the town of Tanjore, situated as we know it to be, not on the alluvium of the delta, but on the apex of a spur of higher ground, the question arises whether the conditions affecting the delta hold in it also. The nature of the soil on which the town is situated has already been alluded to as consisting of lateritious earth over a soft grit. Now, this grit in general is so porous that no water rests upon it, and only here and there it is retentive enough to allow of accumulation of surface water, so that in order to obtain water, the wells have to be sunk into it for a considerable depth. In fact, the wells appear to be sections carried through this stratum to the level of a body of water continuous with that permeating the soil of the delta. That such is really the case appears to be indicated by the following table, showing the water-levels of wells situated at various points of the gradually sloping ground which the town occupies :—

WELLS IN UPPER PART OF THE TOWN.			WELLS IN LOWER PART OF THE TOWN.		
No.	Water-level.		No.	Water-level.	
	Feet.	Inches.		Feet.	Inches.
1	22	7·5	1	15	0·5
2	22	0·5	2	14	6·0
3	20	0·5	3	13	11·0
4	19	3·0			
5	18	4·0			
6	18	4·0			
7	17	7·0			

Water in the wells seemingly continuous with that permeating the delta.

Allowing for the gradual subsidence of the ground towards the delta, the levels in the above wells correspond so closely with one another and with the general water-level of the delta, that there appears to be small room for doubt that the water exposed in the wells is a portion of a body of soil moisture continuous with that on the delta, and affected by the same conditions as influence it.

92. Although this appears to be the case with the wells at Tanjore, it can by no means be predicated of all those throughout the spur, as is clearly manifest from the following facts regarding Vallam kindly supplied by Mr. Cadell, the Collector of the Tanjore District.

Wells at Vallam.

"There are three principal wells at Vallam from which villagers, almost without exception, draw their water for drinking purposes. These are situated at a distance of about 150 feet from the high level tank, and about 15 feet below the tank Calingulate; the soil being laterite, the water percolates from the tank, and the water in the wells rises and falls with the supply of water in the tanks."

Vallam Wells.

No.	Total depth.		Distance of water-level from surface in January 1871.		
	Feet.	Inches.	Feet	Inches.	
1	44	0	4	0	Near the high level tank.
2	34	0	4	0	
3	37	0	4	0	
4	38	0	3	0	Towards the dip of the laterite formations.
5	46	3	12	0	

Vallam less liable to cholera than Tanjore.

Vallam is situated on the highest part of the spur, and at an elevation about 80 feet above Tanjore. It lies close to the edge of the higher ground, which does not here subside gradually as at Tanjore, but dips abruptly to the level of the delta. There is a very large amount of laterite in the soil, occurring in beds of several feet in thickness, and it is plain from the facts regarding the wells that the conditions of soil-moisture prevailing here are different from those at Tanjore, so that, according to the soil theory, we have no right to expect an exact coincidence between the cholera occurrences of the two places. What the conditions under which the disease occurs at Vallam are have yet to be ascertained, but the locality is at all events known to be much less prone to cholera than Tanjore and places situated on the alluvium of the delta.

Water-supply of Tanjore.

93. In Tanjore the principal source of drinking water is a large deeply excavated tank, the sides of which are lined with stone. It is situated within the small fort, and receives the drainage of the higher ground outside the walls. From this various channels pas-

Dietary of inhabitants.

into smaller tanks within the town, but a large number of the inhabitants derive their water directly from it. The water in it (*vide* Note A), although of a red color from the lateritious nature of its drainage area, is, in as far as microscopic evidence goes, very free from organic impurities. The natives, although very partial to it, ascribe the abundance and aggravated character of the elephantiasis endemic in the town to its use. As usual in an irrigated district, the staple article of diet is rice; and, seeing that the new grain comes into the bazaar in the end of December and beginning of January, the native mind is provided with a satisfactory explanation of the coincident seasonal development of cholera.

Tanjore on a soil abounding in laterite and specially prone to cholera.

District of Tanjore is well wooded.

94. There are two additional facts to be noted, respectively, regarding the town and district of Tanjore: 1*st*, the town affords an example of a locality with a soil abounding in laterite, and at the same time prone to cholera, thereby opposing the views advanced by some as to the essential inhibitory influence of a lateritious soil independent of its physical condition; 2*nd*, the district of Tanjore abounds in trees and is specially prone to cholera. In such a highly cultivated district as this, there is of course very little jungle, but the abundance of hedge-row trees is everywhere so great that the delta, looked at from the more elevated ground of the laterite spur, presents the aspect of an almost unbroken forest. This appears to indicate that the mere presence of an abundance of trees does not exert much protective influence if associated with high cultivation and a dense population.

Main cholera-facts are accordant with the soil theory.

Cholera of 1870-71.

95. The main facts relative to the normal development of cholera throughout the Tanjore district present many features which seem to accord well with the soil theory, and although it would be premature to found any conclusions on the phenomena, it is yet noteworthy that in the cholera season of the north-east monsoon of 1870-71, there was, up to the close of January at all events, and in concidence with a high river-level, some apparently inhibitory influence at work, for although isolated cases of cholera occurred, there was no epidemic development of the disease.*

Situation of Trichinopoly.

Town surrounded by irrigation channels.

The rock.

96. TRICHINOPOLY.—The district of Trichinopoly is situated to the north and west of Tanjore, and is divided into two unequal portions by the Cauvery. The town or fort of the same name is situated on the south bank of the Cauvery, immediately opposite the island of Sreerungum, which, as previously mentioned, is formed by the primary division of the river into its two main branches. A little above the town, an irrigation channel of considerable size, the Weycondah, passes off from the river, curving round to the south and east, and giving off numerous branches in its course. One of these is connected with the river by a narrow channel which, passing close to the eastern side of the town, completes the circle of water surrounding it. Immediately around the town, and between it and the suburbs, the ditch of the fortifications was situated, and still in part remains as a shallow hollow choked with weeds and full of stagnant water. A great portion of it has, however, been recently filled up, and the area so gained converted into a boulevard. At the northern end of the town, the celebrated rock of Trichinopoly rises abruptly from the level ground. Immediately around it is a narrow, slightly elevated area formed by the first projecting surfaces of rock, and from which it rises almost vertically. This terrace-like elevation is separated from the rest of the town by a wall and forms the rock fort, while on the rock itself every available space is occupied by pagoda buildings, one of which is situated on the very summit.

Tanks, wells, and their water-levels.

97. There are numerous wells within the town, but the water in them is generally of inferior quality, and the main source of drinking water is furnished by a series of very fine stone-lined tanks, which are connected with one another and ate supplied with water from one of the river channels. From these the inhabitants, save the Brahmins who use the water of the sacred Cauvery, derive their drinking water.

The water-level in the wells, when examined in January 1871, varied slightly in different instances, but in all cases was superficial. Measurements were taken in two wells with the following results:—

No.	Water-level.	
	Feet.	Inches
1	9	2
2	12	0

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* For microscopic characters of the waters, *vide* Note A., 47—51.

Nature of the soil.

The soil on which the town is built is red and apparently very shallow, as rock crops out in all directions in the sides of the channels surrounding it, generally in a state of advanced disintegration, but here and there hard and seemingly unaltered.

Cantonment.

Nature of the soil.

98. The cantonment is situated about two miles distant from the town, and separated from it by the Weycondah channel. It occupies a portion of a plain from which isolated masses of gneiss of the same character as the Trichinopoly rock protrude in various places. The soil is red, gravelly, here and there containing laterite, and resting on the usual basis of rock.

Water-supply.

99. Water is present in abundance, and close to the surface. Its quality varies greatly in the different wells, in some being brackish, and in others of excellent quality. The following table shows the results obtained by measurements of various wells:—

No., &c., of well.	Depth of well.		Water-level from surface.	
	Feet.	Inches.	Feet.	Inches.
No. 1 well, used by Infantry	31	0	18	6
No. 2 well in Poothoor, used by 26th Regiment Native Infantry ...	19	0	11	0
No. 3 well, used by Artillery	15	0	8	2
No. 4 well, in William's Road	27	0	16	0

There is very little ground under wet cultivation within the cantonment, but all round the town there are numerous paddy-fields.

Situation of District and Central Jails.

100. The Central Jail occupies an open, slightly elevated portion of ground at the base of one of the isolated rock masses before alluded to. The soil here is of the same description as elsewhere, and the rock is close to the surface, as shown in the sides of the wells. The old District Jail is situated close to the town in a low piece of ground, "rendering drainage difficult."

The island of Sreerungum.

101. The island of Sreerungum, in which the celebrated pagoda town of the same name is situated, is low, flat, and only very slightly elevated above the river. It is sub-divided by several shallow channels, and is apparently in most part a mere alluvial deposit, the loose soil being permeated by water at no great distance from the surface. In one well, in which measurements were taken, the water-level was in January 1871 at 13 feet 8 inches from the surface; and as the natives stated that the well throughout its whole depth was excavated in soft soil—a statement confirmed by its earthenware lining—it apparently is dependent on the river for its water-supply. Few of the inhabitants derive their drinking water from the wells, the majority preferring to bring it from the Cauvery, which also naturally serves as the source of supply to the pilgrims. The whole surface of the island is under high cultivation, and there is much paddy ground around the town.

The Cauvery, the main source of drinking water.

Cholera season.

102. The district and town of Trichinopoly has long enjoyed an unenviable reputation as specially prone to cholera. As previously mentioned, the dry weather of the north-east monsoon is the season in which the disease manifests itself in epidemic fashion, travelling gradually down the Cauvery from the north-west, and breaking out in force during, or shortly subsequent to, the great Sreerungum festival in the latter part of December.

Soil conditions in the Trichinopoly district less uniform than in Tanjore.

103. The soil conditions in this district are much more varied than in Tanjore, and the changes in soil-moisture must almost necessarily be very much less regular and uniform. Some parts of the district, as for example those places around the town, sub-divided by numerous irrigation channels, and more especially the island of Sreerungum, must be influenced by the river, as regards conditions of soil-moisture, in exactly the same way as the low ground of Tanjore. In other portions, however, where, as in the cantonment, there is an absence of channels and a shallow rocky soil, it is not so easy to see how the river can exert any very general influence, and here probably the local rainfall is of more importance.

One suburb is specially liable.

104. As regards the town itself, the local authorities state that cholera generally appears first, and manifests itself with greatest intensity in a suburb of the name of Varaganeri. This is situated on the east side of the town on the low ground occupying the angle formed by the junction of a channel from the Weycondah with the small channel previously alluded to as passing directly from the river. The level of the water in these channels is, when they are full, almost flush with the surrounding ground, and well adapted for the irrigation of the neighbouring paddy-fields. The

channel from the Weycondah is closed, and remains dry during February, March, and April, when the river has become low, and the water in the Weycondah not more than sufficient for the supply of the villages further to the east. While it remains open the inhabitants of Varaganeri derive their drinking water from it, and during the time it is closed from a shallow tank situated on one side of it and filled with water by it. There are hardly any wells in the village, as the people rely almost entirely on the channel and tank as sources of water. The water-level in the small number present is quite superficial. In one, in which its height was measured, it was found to be at 6 feet 8 inches from the surface. The soil appears to be of the prevailing shallow character, and in some places rock surfaces are exposed. The streets in the village are narrow and very dirty, contrasting, in the latter respect, most unfavorably with those within the town, and many houses show distinct evidence of the dampness of the locality in an abundant growth of green algoid matter covering the lower parts of their wells.

Sources of drinking water in Varaganeri.

Nature of the soil.

105. In the physical conditions of this place, we certainly have everything which is supposed by the soil theory to favor the development of cholera, for we have a low-lying area of shallow, organically polluted soil lying in the angle formed by two irrigation channels, and consequently subject to great fluctuations in soil-moisture, dependent on the varying amount of water in them. We also find that the cholera season coincides with the occurrence of a subsident fluctuation, and commences, not when the channels are at their lowest, that from the Weycondah channel entirely closed, and the inhabitants of the village restricted to the concentrated water of the tank, but while the channels are gradually subsiding after the floods of the north-east monsoon.

Physical conditions favorable to the development of cholera.

Cholera season begins before the water has become concentrated.

106. In the area originally included within the town walls, the most interesting locality, as regards the soil theory, is the Rock Fort, as it appears to be almost impossible that any of the assumedly important soil conditions for cholera development can be present within its limits, except in extremely localized spots, seeing that the rounded and sloping surfaces of rock, covered as they are by a mere trace of soil, must secure rapid and perfect drainage into the lower part of the town, and thoroughly prevent the accumulation of any fluctuating body of soil-moisture over the general area. Unfortunately no information of a really accurate nature regarding the occurrence of cholera here, as compared with its occurrence throughout the rest of the town, appears as yet to have been recorded. The information attainable in the Municipal Office was to the effect that the inhabitants of the Rock Fort suffered severely from heat, but that cholera had never prevailed in it, the asserted exemption being ascribed to the scantiness of the population, due to the employment of many of the buildings as Government offices. The Tehsildar, who has been for a considerable length of time at Trichinopoly, and who is a man of great intelligence, confirmed this as regards the last ten or eleven years, stating that, while during that period cholera had frequently prevailed severely in the town, a very few cases only had occurred in the Rock Fort. Regarding the occurrence of the disease at any previous period, he did not profess to know anything certain, but had heard that it once did prevail severely.

The Rock Fort.

Data regarding the occurrence of cholera in it.

107. Of course in such a locality the mere occurrence of isolated cases is of little value as evidence against the soil theory, for, as it is surrounded on all sides by areas presenting the conditions for the development of the disease, not only is there the liability to the occurrence of imported cases, but, considering the narrowness of the area which ought to be exempt, and the fact that it lies immediately around a huge mass of bare rock which must tend to establish an inward draft of air, there will always be a liability to the introduction of the assumed poison developed in the surrounding soil.* If, however, any satisfactory evidence should at any future time be obtained, showing the spread of the disease from a centre within the Rock Fort, it will certainly be very much opposed to the universal applicability of the soil theory as at present expounded.

Cases must show distinct evidences of local development in order to be of any weight against the soil theory.

Influence of the rock.

108. The District and Central Jails, presenting as they do such marked differences in their physical surroundings, appear likely to afford a very valuable field for future observation. Up to the present time they have shown decided differences in their respective liabilities to cholera, for while the low-lying District Jail is subject to the disease, the Central Jail, on an open and high site, has as yet enjoyed a total immunity. This immunity is, at present, of comparatively little value as evidence for or against any theory, as the jail has only been in occupation since 1867, and even were its occupation of much longer duration, the immunity would certainly be capable of being interpreted so as to favor almost any theory; for although in comparing the localities we find the soil conditions of the Central Jail to be less favorable than those

Facts regarding the District and Central Jails.

Capable of various interpretations.

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* *Vide* page 151, regarding a similar influence at St. Thomas Mount.

of the District Jail to the development of the germ of the soil theory, we also find much greater isolation in the former than in the latter. In the meantime, the fact of the immunity of the Central Jail appears to be worthy of record, for the sake of comparison with the results which may be expected in the future from the careful observations of two localities so near to one another, and affording such excellent fields for exact investigation as jails necessarily do.

Special liability of Sreerungum perfectly accordant with the soil theory.

109. That cholera should be specially partial to a locality such as Sreerungum is thoroughly in accordance with the views of Professor Pettenkofer, for, not only are all the important soil conditions of organic contamination and fluctuating soil moisture present, but the seasonal development of the disease as an epidemic coincides with a subsidence in soil moisture; that is to say, the seasonal development of the disease occurs under the conditions in which it ought to occur in any locality with a superficial water-level and a soil liable to saturation. It is manifest that there are abundant facilities for the introduction of material to be locally developed, for, in a pagoda town to which pilgrims resort in large numbers and from different parts of the country, there is a constant liability to introduction of the disease or of the elements leading to its development; and when once the poison exists, whether due to direct importation or local development, it has a very fair field for its operation.

Cholera in 1870-71.

Small number of cases in Sreerungum not to be ascribed to any want of material for the poison to work upon,

and the poison was introduced.

Strong points for the water theory,

but showers did occur,

and the soil conditions present were those tending to exemption.

Water-level in cantonment wells high in January 1871.

River may indirectly influence conditions of soil moisture in localities not directly affected by it.

Definite conclusions premature.

110. Proceeding to the consideration of the facts regarding cholera in the season of 1870-71, the first thing to be noted is that, as at Tanjore, the disease, although occurring in isolated cases, appeared to be unable to diffuse itself as an epidemic, at all events, until the end of January 1871, for up to that date only 58 cases had occurred in the town, and these were quite scattered, and gave no evidence of diffusion from any common centre. The great Sreerungum festival had also passed over with the occurrence of only ten cases of cholera, half of which were treated in hospital, while the remaining five, due to the native prejudice, did not come under treatment. The small number of the cases could not be ascribed to want of material for the poison to work upon, for although, owing to the efforts of the civil authorities in various districts, the number of pilgrims was smaller than usual, yet the concourse amounted to 15,000 or 16,000, and afforded a very fair field for the operation of any disease requiring mere human intercourse and contagion for its propagation. On the other hand it cannot be ascribed to non-introduction of the poison, for there was enough present to produce the few cases above alluded to. The disease was present, but some condition or conditions unfavorable to it prevented its diffusion. A purely contagion theory therefore failing to throw any light on the phenomena of the year, we have next to consider how far other theories answer. There can be no doubt that there are here strong points for the theory which regards choleraically polluted water as the direct exciting cause of the disease, for there was a smaller rainfall by 3·5 inches in December 1870 than in December 1869, and consequently there was less likelihood of the in-washing of choleraic materials. At the same time heavy showers did occur during and shortly after the festival, so that there was by no means a total absence of opportunities for the introduction of the poison. On the other hand the conditions under which this exceptional exemption occurred, present some very decided features of accordance with the requirements of the soil theory; for the Cauvery was unusually high for the time of year, and consequently all those areas more directly under its influence contained an unusual amount of soil water. But many places not immediately influenced by the river also contained a very large amount of soil moisture in the end of 1870 and beginning of 1871. That this really was the case was manifest from the condition of various wells in the cantonment, and from the fact that the excavation of new ones in the Central Jail had to be temporarily stopped, owing to the height of the water-level threatening to cause wholesale in-washing of the surface soil. That the water-level in these places was absolutely higher than at the corresponding time of the previous year, cannot be asserted, as there are no data on the point. It may at first sight seem to be impossible that it should have been otherwise than lower, seeing that the total rainfall for the year, although 2·9 inches above the average, was yet 6·5 inches below that of the previous year, 5·41 inches of which difference being due to October, November, and December rainfalls of the respective years. The state of the river must, however, be taken into account; for although not directly determining the amount of soil-moisture in these places, it appears probable that a high river level, and consequent large area of soil directly permeated by its water, will do much to counterbalance a diminished local rainfall, by preventing the rapid drainage of the soil water derived from the latter. In regard to the general cholera facts of the district, it is very manifest that it is quite premature to draw any definite conclusions regarding their precise bearing on various theories, and more especially on the

soil theory, for in a district in which various areas are subject to such very different influences as regards soil-moisture, it is only by accurate data of the seasonal and local distribution of the disease that conclusions of any value can be reached.[*]

Places visited in the Ceded Districts.

111. THE CEDED DISTRICTS.—The only localities which were visited in this part of the Madras Presidency were Bellary, Gooty, and a village between the latter place and Kurnool, in which a severe local outbreak of cholera occurred in January 1871.

Characters of the soil.

112. These districts present great variations in the nature of the soil prevailing in various parts of them. As a general rule, the soil is shallow, in many places extremely so, especially in the neighbourhood of the numerous ranges of low, flat-topped hills which traverse the country in all directions and divide it into a number of circumscribed plains of various sizes. The nature of the soil, as well as its depth, varies greatly in these plains, for while near the hills it is usually red and gravelly, in the centre and lower parts of the level ground there is frequently much black cotton soil, and in some places, especially near the water-courses, large areas of almost pure sand. The transition from the black to the red soil is often extremely abrupt, a distinct line of demarcation between the two being sometimes visible even within the limits of a single field.

Red and black soils are differently affected by moisture.

113. It is quite plain that these two soils will be very differently affected by the addition of any given amount of moisture, for the red porous soil allows water to pass through it very rapidly, while the cotton soil, although very porous, does not allow water to pass through it rapidly, but absorbs a large amount of it, at the same time swelling up and increasing in bulk to a great degree.

Rainfall.

114. The rainfall throughout the Ceded Districts is small in amount, owing to the existence of hill ranges on either side, which shut them off from the sea and prevent the occurrence of much rain with either monsoon.

According to the soil theory, cholera ought to be a disease of the moist season,

and there ought to be local exceptions.

115. Here, as in the case of the Mysore country, from the general shallowness of the soil and the moderate rainfall, we should, according to the soil theory, expect to find the period of general cholera diffusion coinciding with the season in which the soil is kept moist by the rains, and not with the dry weather of the north-east monsoon; since during the dry weather, and when the rain has once fairly ceased, the shallow soil in many places must almost immediately pass into such a complete condition of dryness as to render it quite unfit to afford a *nidus* for the development of the supposed germ. As in Mysore also, but to a more decided extent, owing to the greater amount of soil variations, we may expect to find localized exceptions as to seasonal liability, dependent on the various conditions of soil moisture caused by natural position, artificial accumulations of water, or meteorological peculiarities of special years.

Facts accord with these assumptions.

A contagion theory and theories of concentration of water-supply both fail to throw any light on the facts of the seasonal occurrence,

but the soil theory and that of direct poisoning by water do not.

116. Now we find that the facts of the case accord very closely with the *à priori* conclusions of the soil theory; for the normal season for widespread general diffusion of cholera is during the south-west monsoon, while at the same time scattered cases, and small, though severe, localized outbreaks may and do occur throughout the whole year. It is hard to see how contagion can throw any light on these phenomena of seasonal prevalence, for the south-west monsoon certainly does not facilitate traffic or intercourse over the greater part of the Ceded Districts. Theories laying great stress on concentration of water and its contained impurities also fail, and the only theory which appears to be able to hold its own, as compared with the soil theory, is that which regards direct pollution of water as all-important, for the rains of the south-west monsoon[†] may no doubt be alleged to tend to facilitate the entrance of choleraic impurities into the sources of water-supply.

Situation of Bellary.

The rock.

117. BELLARY.—The station of Bellary is situated at the base of an isolated rocky mass, which projects abruptly from the middle of a flat, hill-surrounded plain. The ground slopes very slightly from the foot of the rock, and on this sloping surface the greater portion of the cantonment is situated. The rock is composed of "granitoid gneiss," and on two sides descends abruptly to the plain in smooth bare sweeps and curves. The remaining sides, instead of showing continuous rocky surfaces, are covered with irregular boulder-like masses, heaped on one another in fantastic confusion. The summit, as is usual in similar situations in this part of India, is surmounted by a fort, and at the foot

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[*] For microscopic [illegible]racters of waters, *vide* Note A., 52—66.

[†] This statement of course refers merely to theories as to local development.

The lower fort.

on the southern side, occupying a portion of slightly elevated ground, is the lower fort within which the entire European force of the station was located previous to the construction of the new barracks.

Large tank.

118. Immediately to the south-west of the lower fort is a tank, which, occupying a portion of the ditch round the rock, and receiving the water drainage from the bare rocky slopes above, forms the source whence the garrison and the greater portion of the remaining inhabitants of the station derive their drinking water. At a short distance to the south of the fort is a large surface tank, or what is a tank at the close of the rains; for although at that time the water occupies an area of several miles in circumference, yet, on account of its extreme shallowness and large exposed surface, it very rapidly diminishes in quantity and soon dries up altogether, leaving a large piece of ground in which various wells are sunk, and on which cultivation is carried on.

Situation of the new barracks and of the bazaars.

Situation of the Native Cavalry lines.

119. The new barracks are situated at some distance from the fort on an open and very slightly sloping surface. There are two native bazaars at Bellary, and if there be any truth in the soil theory, both of them are unfortunately situated relatively to the large surface tank; for while one, Cowl bazaar, occupies the low ground subsiding imperceptibly into the bed of the tank, the other, Bruce Pettah, is situated immediately beyond the bund which retains the water at the opposite end. The former bazaar is close beneath the walls of the lower fort, while the latter is removed from it by the whole length of the tank. On the opposite side of Cowl bazaar from the fort there is a shallow nullah, the sandy bed of which is a water-course during the rains, and close to which the native cavalry lines are situated. On the other side of these lines towards the rock, and extending from the upper end of Cowl bazaar, is the ground occupied by the greater number of the European houses of the station.

Nature of the soil.

120. The soil is almost everywhere extremely shallow, still there are considerable local variations in its depth, as the outline of the rocks beneath is very irregular and the amount of their disintegration very various, so that the contour of the surface can by no means be taken as an accurate index of that of the sub-soil. This is clearly demonstrated by some of the sections presented by the shallow watercourses, in which it is very easy to see that in a portion of ground with a smoothly sloping surface, there may be numerous localized spots in which water is retained. The surface soil is in some places of various shades of red, in others almost white, and is everywhere extremely open and gravelly, due to the abundance of fragments of undisintegrated rock. In many places it is almost impossible to draw a line separating the soil from the decomposing rock from which it is formed. The direction of the foliation of the rock is very irregular, for while in some places it is horizontal, in others it is almost vertical, and in still others it occupies all intermediate angles between the former and the latter position.

Wells and water-supply.

Wells, as a rule, incapable of affording information regarding conditions of soil-moisture.

Local exceptions.

Well affording drinking water to the Native Cavalry.

121. There are numerous wells in and around the station which afford a scanty supply of water, in many cases of very hard and brackish quality, and only reached at a considerable depth. It appears hardly possible that these wells, with a water-level far removed from the surface and deeply sunk in the rocky strata, should, as a general rule, be capable of affording any exact information of conditions of moisture in the soil above. Information on this head can, in a locality with a soil and sub-soil of the nature prevailing here, be only approximately attained to by taking observations on the condition of surface accumulations of water in tanks, &c., for the layer of water shown in the wells is in many cases of no importance in regard to the soil of the locality in which it is exposed, being effectually separated from it by intervening layers of hard rock, above which the local changes in soil-moisture occur. On the other hand, it must be borne in mind that it is quite possible that in certain places this deep-lying body of water may be the first and assumedly influential layer, as, where the foliation of the rocks is vertical, and their disintegration has advanced to a considerable extent, nothing in the way of an impermeable partition may intervene between the surface of the soil and that of the water, and moisture applied to the former may speedily drain down through the loose soil and fissured rock to the latter. The well from which the men of the Native Cavalry derive their drinking water appears to be an example of the former class of wells, for although it is situated in the middle of a crowded grave-yard, there is no evidence of the use of its water producing any evil results, and the water in microscopic characters showed no signs of organic contamination. (*Vide* Note A., 70.)

Facts regarding cholera in Bellary.

Season.

122. As regards the occurrence of cholera in Bellary, there are several facts to be noted; *1st*, the disease, as in the other parts of the Ceded Districts, generally prevails during the south-west monsoon; *2nd*, the localities in the station which it specially affects are Bruce Pettah and Cowl bazaar, in regard to the latter of which we

The bazaars specially liable.

Facts regarding the lower fort.

find it remarked that "it is in this locality that cholera always begins and always ends;"* *3rd*, that while the European troops occupied the lower fort they suffered frequently and severely from cholera. Dr. Balfour gives the following statistics on this point:—

Average annual ratio per 1,000 of mean strength admitted.

Honorable Company's Foot Artillery, 9 years, 1833 to 1841 ...	28·93
Her Majesty's Infantry (adjoining), 10 years, 1829 to 1838 ...	19·36
Ditto ditto Officers, „ „ ...	35·71

Cholera of 1869 in Bellary.

Rainfall in 1869.

Amount of cholera in the district.

4th, in regard to the station during the epidemic cholera of 1869, we find that only 21 deaths occurred out of a municipal population of 37,015, and that "the attention bestowed upon this station by the military and municipal authorities appears to have had a favorable influence in warding off epidemic diseases or diminishing their severity;" *5th*, the rainfall at Bellary in 1869 only amounted to 11·62 inches, the average rainfall of the station being 24·7; *6th*, during 1869 there was little cholera in the district of Bellary before May, but it spread rapidly and prevailed severely after the fall of the early rains.

Special liability of the bazaars is accordant with the soil theory.

Influence of the rock on the lower fort.

Facts of 1869 in reference to the soil theory.

Rainfall of 1869 not below the average throughout the whole district.

123. In considering the bearing of these facts on the soil theory, it is to be remarked—*1st*, that the special liability of Bruce and Cowl bazaars appears to accord well with the requirements of the theory, as these localities, owing to their position relative to the large tank, must be exposed to a special local amount of fluctuation in soil-moisture, a great part of Cowl bazaar being situated on a piece of ground which must be affected by the obstruction of the natural drainage which causes the accumulation of water in the tank, while Bruce Pettah, situated as it is immediately below the bund, is exposed to the gradual percolation of water from the tank into the soil beneath it; *2nd*, that the fact that the lower fort was formerly the site of frequent and severe outbreaks of cholera is not so easy at first sight to adapt to the soil theory, as, taken as a whole, the locality is such that any general diffused accumulation of fluctuating soil-moisture and organic impurities seems almost precluded. Still, as previously noted regarding the station in general, the formation of the soil is such that localized accumulations of water and of organic matter may easily occur beneath a sloping surface. In regard to this fort also, as in regard to the rock fort at Trichinopoly, we must take into account the inward current established by the heating of the huge mass of bare rock beneath which it lies, rendering those within the walls liable to be exposed to the influence of morbific agents manufactured in the immediately surrounding localities, and while at Trichinopoly the rock fort is closely surrounded by the town, at Bellary, just beyond the fort walls, are Cowl bazaar and the large area occupied by the fluctuating moisture of the surface tank. Want of thoroughly accurate data, as usual, prevents any definite conclusion being formed, but the above considerations may at least serve to show that the occurrence of cholera in an area such as this is, is no satisfactory demonstration of error in the soil theory. *3rd*.—That the facts regarding the cholera of 1869 present various features, which, in as far as they go, are decidedly in favor of the soil theory, for we find, *1st*, that the disease, although introduced into the district, did not spread until the occurrence of the early rains; and, *2nd*, that the station of Bellary enjoyed a marked relative immunity coincident with a local rainfall, and consequently an amount of soil-moisture very greatly below the average. This latter fact would, of course, be of much greater significance if it could be compared with data regarding the rainfall and soil-moisture throughout the district, as cholera, while very slight in the station, prevailed severely in some other places. That the rainfall of 1869 was not below the average throughout the whole district is demonstrated by the fact that at Ramandroog, only 38 miles from Bellary, the rainfall was 39·6 inches, the average being 36·0 inches. This implies that at even such a short distance the rainfall, in place of a deficiency of 13·08 inches, showed an excess of 3·6 inches.

Concentration of water-supply failed to induce great development of cholera.

124. In connection with this point, it is to be noted that the concentration of the water impurities due to drought, supposed by some to be so very influential in inducing wide diffusion of cholera when introduced by human intercourse, did not appear to do much in that way in this instance at least.

Facts of 1869 in reference to the water theory.

125. On the other hand, there can be no doubt that the facts are capable of an interpretation favorable to the theory of direct poisoning by means of water; for the same deficient rainfall, establishing an abnormally dry condition of soil, may be regarded as tending to prevent the in-washing of impurities into sources of water-supply. But it must be recollected that this hardly affords a very satisfactory explanation of the small development of the disease after it was fairly introduced into the station, and when from the occurrence of the

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* Macpherson.

21 cases before alluded to, we must, according to this theory, concede that there had been a poisoning of sources of water-supply.*

Situation of Gooty.

126. GOOTY.—Gooty is situated in the Bellary Collectorate, and almost due east from the station of that name. It has always been celebrated as a cholera locality, and if human intercourse has any influence on the introduction of the disease or of its germs, it is easy to see why this should be the case, seeing that the town occupies a locality from which the Bellary, Bangalore, Cuddapah, Kurnool, and Raichore roads radiate from a common centre. It occupies a hollow at the base of a range of low hills on which the fort is situated, and in the concavity of the semicircular curve which it forms. To the west of the town the ground sinks to the level of the general surface of the low country, but in all other directions the ground is so much elevated around it as to conceal it completely until it is actually reached.

Nature of the soil.

Conditions of soil-moisture.

Tank.

127. The soil around is red, very porous, and full of fragments of stones of all sizes. Rocks of various kinds crop out through it in all directions, and in many places the surface over wide areas is covered with white, snow-like saline incrustations. Although very dry and arid in appearance, the country is by no means so devoid of vegetation here as near Bellary, and the dryness of the soil is at certain times of year more apparent than real. In February 1871, the wells, unlike those of Bellary, showed water in the gravelly soil within a few feet of the surface. A tributary of the Pennaur river passes at no great distance from the west of the town, flowing over a very shallow and sandy bed, while closer to the town on the same side is a very large, shallow, bunded tank. In the level ground on either side of the stream are numerous small marshy patches, whilst in February 1871, almost every shallow excavation either contained water or showed evidences of having very recently done so.

Rain and cholera.

128. The rains begin to fall in the Gooty district in May, and from May to August is said to be the season in which cholera usually prevails.

Diet of the inhabitants.

129. The inhabitants of Gooty and the surrounding country depend on *cholum* as their main article of diet, and although they have no idea of any special tendency in new grain to produce cholera, they nevertheless consider it generally unwholesome, and consequently are cautious in using it.

Cholera of 1869.

Absence of cholera in 1870.

130. In the cholera season of 1869, there was a considerable prevalence of the disease in the town, and it is noted that although prevailing at the railway station and in the population resident in the neighbourhood as early as April, it nevertheless did not reach the municipal town till the 30th June, the distance between the two places being only two miles. During the season of 1870, there was no cholera in Gooty, despite of the usual influx of enormous numbers of Triputty pilgrims in September who halted at Sir Thomas Munro's choultry.

Soil conditions are such that different places ought to have different seasonal liabilities.

Accurate information as to local distribution very important.

131. Time having been available only for a very cursory examination of Gooty and the neighbourhood, it is not easy to pronounce definitely as to the bearing of the cholera phenomena presented by them on the soil theory. Judging from the state of the country in February 1871, it certainly appeared that in many places, as for instance near the railway station, the soil conditions of moisture are such that the disease ought, according to the theory, to prevail during the dry weather, as in these places the porous soil is permeated by a superficial body of water. In other places, however, the conditions are very different, the soil being very shallow and rapidly drying down to the rocky sub-soil, and in these a prevalence during the rains might be looked for. It appears probable that the town of Gooty itself belongs to this latter class, as, due to its position relative to the hills, its soil must during the continuance of the rains be subject to great fluctuations in amount of moisture, while at their close it must rapidly pass into a state of extreme dryness, due to its shallowness, and the facilities for rapid drainage of surplus moisture into the lower ground. There is, however, no satisfactory evidence on the subject, and the most important point to be noted at present in regard to this district is that in it we find such variations in the characters of the soil as must, if the soil theory be valid, induce corresponding variations in the seasonal liabilities to cholera of various places; and that in order to estimate the applicability of the soil theory to it, we must have definite information regarding the localization of the disease throughout periods of prevalence, and not merely information regarding the duration of such periods and the number of cases occurring in them.

Situation of Cottapully.

132. COTTAPULLY.—This is a small village on the road leading from Gooty to Kurnool, and was visited in February on account of its having been, shortly before, the site of a severe localized outbreak of cholera. It is situated immediately at the base of a small boulder-covered mound, which projects from the surface of one of those circumscribed basin-like plains which characterise this part

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* For microscopic characters of waters, *vide* Note A., 67—72.

of the country. This mound is almost at the lowest part of the basin, close to a shallow dry watercourse, and is apparently the termination of a spur from one of the surrounding hill ranges, as a slightly elevated ridge passes between the two. The rocky basis of which it is formed is much and irregularly fissured, the rock in the neighbourhood of the fissures much softened and disintegrated, and the superimposed boulder-like masses surmounting it seem to be a result of the more advanced weathering of fragments detached in the same manner.

Nature of the soil.

133. The soil from which the mound projects, as clearly demonstrated in a section afforded by a deep excavation at the side of the road, is red and extremely porous, in many places composed of almost pure gravel, and in all full of small fragments of stone.

Village dirty and crowded.

134. The ground slopes slightly from the base of the mound to the level of the watercourse, and on this slope, immediately below the rock, and with a few of its component houses absolutely on the first exposed surfaces, the village is situated. The houses are irregularly huddled together, the ground uneven, and in some places absolutely sloping towards the rock, and the whole place very dirty and crowded with human beings, cows, buffaloes, and goats.

Water-supply.

135. The village is, as usual, almost surrounded by walls, the main entrance being by a gateway opposite the rock. Close to this gateway, between it and the watercourse, is a shallow open well, which constitutes the source of supply of drinking water. At the time of inspection, the water in this was at a level of about 10 feet from the surface of the ground, and was reached by means of a flight of stone steps. The sides of the well are lined with uncemented stones. At a few yards distance from the other side of the watercourse, there is another shallow well, which yields water for the irrigation of a small patch of paddy ground situated close to it. The surrounding country is open and tolerably flat, until the hilly boundary of the basin is reached.

Cultivated ground.

136. There is a considerable quantity of ground occupied by fields of *cholum*, castor-oil, &c. Few trees of any size are present, but there are numerous low stunted ones, especially along the line of the watercourse.

Facts of the outbreak of cholera.

No cholera between Gooty and Cottapully.

None at Yeldurti,

or other villages through which the pilgrims passed.

137. The circumstances of the outbreak of cholera in January were as follow:—According to information derived from the office of the Assistant Collector of Kurnool, a party of about 50 pilgrims, returning slowly in bullock bandies from Sreerungum to their homes in the Nizam's territory, arrived at Cottapully on the evening of the 23rd January. They had left Sreerungum about 20 days previously, just at the close of the festival; there is no evidence showing that they suffered from cholera previous to their arrival at Cottapully, and there was no cholera known to exist at that time in any of the villages on the road which they had traversed between Gooty and Cottapully. They remained at Cottapully until the morning of the 24th, and during their stay three of their number were attacked with cholera, but were taken with the rest when they left to proceed on their journey. Two of these died in the course of the day's march, and were thrown down by their friends at the side of the road at Yeldurti, a village between Cottapully and Kurnool, while the third recovered. The pilgrims now proceeded on towards Kurnool, but were fortunately stopped, turned out of the main road, and conducted by a circuitous route into the Nizam's dominions; no more cases occurring amongst them while in British territory, or for the next few weeks at least, in any of the other villages through which they had passed, save Cottapully. Next, to return to the consideration of the occurrences in that place, we find that cholera broke out on the 25th, the day after the departure of the pilgrims, spreading rapidly and continuing to manifest itself until the 4th of February, up to which time 50 cases and 19 deaths had occurred. After this no more cases had occurred up to the 17th February, when the place was visited.

Five times as many cases of cholera in Cottapully as in Sreerungum.

Something beyond mere contagion necessary.

Connection between cholera at Sreerungum and at Cottapully not clearly established.

138. There are several very interesting points to be noted in the phenomena of this outbreak:—*1st*, here in a small village, and coincident with the arrival of pilgrims from Sreerungum, we find five times as many cases of cholera occurring as occurred in the town of Sreerungum itself, at a time when, in addition to the ordinary resident population, there were 15,000 to 16,000 pilgrims present. A case of this kind appears to point very distinctly to the importance of the existence of some local condition, quite independent of the mere presence of cases of the disease, in order to secure the general development and diffusion of cholera throughout any given place.—*2nd*, there is no evidence to the effect that the pilgrims introduced cholera into any of the villages on their way from Sreerungum. This appears to point to the same conclusion as the previous fact. But, *3rd*, as they had been 20 days *en route* from Sreerungum without diffusing the disease, and as cholera had hardly been able to manifest itself there, the chain of evidence connecting the Cottapully cholera with the Sreerungum festival is very far from conclusive. *4th*.—The phenomena of the outbreak accord very well with a theory of direct poisoning of the water, and are quite explicable

Phenomena of the outbreak accordant with the water theories.

by it, for the pilgrims during their stay used the well supplying the villagers with drinking water. This well, from its nature and position, is very liable to pollution, and the disease broke out the second day after the arrival of the pilgrims, three of whom suffered from it during their stay in the place, *i. e.*, the outbreak of the disease occurred at a time when the fermentive changes in the assumedly choleraically polluted water had had time to take place. At the same time it must be borne in mind that there was no rain at the time of the outbreak, or for some weeks previous, and if the smallness of the rainfall at Sreerungum and Trichinopoly be assumed to account for the small number of cholera cases there, the total absence of rain here ought even more effectually to have produced a similar result. 5*th*.—The theory which regards the use of organically polluted water as inducing a condition favorable to the development of cholera in any community into which it is introduced by human intercourse, can find much to support it here; for the water-supply was, at all events when visited, very far from pure in its microscopic characters (*vide* note.) At the same time there is nothing to show that it was worse than in other places through which the pilgrims passed, and which did not suffer from cholera in consequence. 6*th*.—While there are features in connection with this outbreak in favor of the water theories, there are others equally strong for the soil theory, or perhaps even stronger, as involving less assumption, for the existing conditions were precisely those which in a shallow porous soil permeated by a body of water are assumed to be of importance in securing the development of the introduced cholera germs, seeing that the soil-moisture had for some time previous been subject to a subsident fluctuation dependent on a continuance of dry weather. 7*th*.—This outbreak of cholera is of some importance in demonstrating that in a district in which, over the general area, the disease is one of the moist season of the year, localized epidemics may take place quite consistently with the validity of the soil theory and dependent on local peculiarities of the soil.*

Absence of rainfall.

The facts also accord with soil theory.

Example of a localized outbreak in the season of general exemption.

General conclusions.

139. As general conclusions of these enquiries into the soil theory, as applicable to the phenomena of cholera in the south of India, I would state—

1*st*.—That with the present extremely imperfect data, it is quite premature to decide exclusively in favor of any one theory regarding the localization of cholera.

2*nd*.—That several of the existing theories may really involve partial truths, and that they only become incompatible with one another when insisted on as absolute and entire explanations.†

3*rd*.—That although in the present report much stress has been laid on the soil theory, it is not on account of any assumption of its essential superiority to the others, but because it appears to be little understood in this country, and to be regarded with a considerable amount of prejudice in consequence. It has seemed to me, therefore, very desirable that the existence of any facts in its favor should be distinctly put forward, and the more so, that there seems to be enough of these to forbid the wholesale rejection of the theory, and to warrant the continuance of careful observations which may teach in time the laws of the association of ground moisture with the propagation of cholera.

PART II.

MICROSCOPIC OBSERVATIONS.

On the characters of choleraic dejecta.

Table of characters of choleraic evacuations.

140. Seeing that the examinations of choleraic evacuations have up to the present time not yielded results warranting the formation of definite conclusions regarding many most important points, perhaps the most satisfactory method of reporting on them is to show, as far as possible, what are the principal characters of such evacuations in Calcutta, leaving the facts in great measure to speak for themselves and to be interpreted at some future period. I have therefore compiled the accompanying table from my notes regarding 100 different evacuations derived from as many consecutively occurring cases, and shall now proceed to the consideration of each of its columns in detail.

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* For microscopic characters of the water, *vide* Note A., 73.

† "Error is almost always partial truth, and so consists in the exaggeration or distortion of one variety by the suppression of another which qualifies and modifies the former."—*The Genesis of Species.*

Table showing the Principal Characters of 100 *Cholera Evacuations.*

No. of case.	No. of evacuation in each case.	Reaction.	PHYSICAL CHARACTERS.		MICROSCOPICAL CHARACTERS.						
							INFUSORIA.				
			Fluid.	Sediment.	Epithelium.	Red blood corpuscles.	Cercomonads, Amœbæ, &c.	Bacteria and Vibriones.	Fungi.	Oval and circular cells.	REMAINING CHARACTERS.
1	Not noted	Not noted	Grey, watery	Pale grey	None	None	None	Abundant	None	Abundant	Undigested vegetable cellular tissue and much molecular debris.
2	"	"	"	"	"	"	"	Not noted	"	"	
3	"	"	"	"	"	"	Abundant cercomonads.	Sprinkling	"	None	Abundant flakes of molecular matter.
4	"	"	"	"	"	"	None	Abundant	"	Abundant, dim	Ditto ditto.
5	"	"	"	Abundant grey	"	"	Abundant cercomonads.	Sprinkling	"	"	Ditto ditto.
6	"	"	"	Abundant, whitish flocculent.	"	"	"	"	"	None	Ditto ditto.
7	"	"	"	"	"	"	"	Very few	"	"	Abundant greenish-yellow cells with one or more clear protrusions.
8	"	"	Faint pink	"	"	"	One cercomonad.	Scanty	"	Very abundant.	
9	"	"	Yellowish	Yellowish flocculent.	"	"	Abundant	Not noted	"	Not noted.	
10	"	"	Pinkish	White	"	"	None	Scanty	"	Very abundant.	
11	"	"	Not noted	Not noted	"	"	Abundant cercomonads.	Not noted	"	Not noted.	
12	"	"	"	"	"	"	One do.	"	"	Abundant.	
13	"	"	"	"	"	"	None	Very few	"	Very abundant.	
14	"	"	"	"	"	"	Very abundant cercomonads	"	"	Abundant.	
15	"	"	"	"	"	"	Very abundant do.	Abundant	"	"	
16	"	"	"	"	"	"	5 do.	Very few	Sarcina abundant.	None.	
17	Last ante-mortem	"	Pinkish	Grey flocculent	"	"	A few do.	Abundant	None	Very abundant	
18	Not noted	"	"	"	"	"	None	Very few	"	Abundant.	
19	"	"	Reddish brown	White flocculent	"	"	"	Hardly any	"	Very abundant.	
20	"	"	Two-thirds of evacuation greenish.	Greenish flaky	"	"	A few	Abundant	"	A few clear hard outlined.	
21	"	"	Five-sixths greenish grey.	Grey	"	"	"	"	"	Abundant	Some of these circular and oval cells exhibited bioplastic movement.
22	"	"	Two-thirds grey	"	"	"	Abundant	"	"	Very abundant.	
23	"	"	Four-fifths greyish brown.	"	"	"	Very few	"	"	Few.	
24	"	"	Not noted	Not noted	"	"	Few, both cercomonads and amœbæ.	"	"	Very abundant.	
25	"	"	Yellowish	Grey	"	"	A few	Very few	"	"	
26	Last evacuation.	"	Three-fourths pinkish yellow.	Large greenish white flocculi.	"	"	Very abundant	Abundant	"	"	
27	Not noted	"	Pinkish grey	Large loose grey flocculi.	"	Abundant red corpuscles.	None	Very few	"	"	
28	"	"	Watery, grey	Scanty large grey flocculi.	"	None	One cercomonad.	A sprinkling	"	A sprinkling	Large quantities of crystals (ammonio magnesian.)
29	"	"	Yellowish grey, reddish above sediment.	Scanty	"	A sprinkling.	Abundant	Not noted	"	Not noted.	
30	"	"	Greyish brown	Large white flocculi.	"	Numerous.	None	"	"	Very abundant and refractive.	Many of the circular refractive cells had a distinct double outline.
31	"	"	Two-thirds pale yellowish grey.	Powdery grey	"	None	Few	Few	"	A sprinkling	Contained much undigested debris of vegetable tissue.
32	"	"	Greyish brown with pinkish tinge.	Large grey gelatinous flocculi.	"	"	"	Mere trace	"	Very abundant	
33	"	"	Pale yellowish grey.	One-fourth large gelatinous and grey.	"	"	"	A trace	"	Abundant	Much undigested vegetable tissue.
34	"	"	Pale brownish grey.	Powdery grey	"	A few	Numerous	Not noted	"	Not noted.	
35	"	"	Four-fifths yellowish grey.	Large grey flocculi.	"	None	None	"	"	Very abundant.	The flakes were full of still, very refractive circular and oval cells, some of the former of considerable size and containing several distinct small masses within them.
36	"	"	One-third grey.	Powdery dirty grey.	"	"	"	Very abundant	"	Scanty.	
37	"	"	Watery pale brown	Large loose brownish grey flocculi.	"	"	One or two "	Not noted	"	Very few	This was a very slight case. Some of the flocculi floated.
38	5th	Alkaline	Two-thirds pale grey.	White	A very few.	Abundant	Abundant	A mere trace	"	Very abundant.	
39	"	"	Clear watery	Few large gelatinous flocculi.	A few	None	None	"	"	A sprinkling.	
40	6th	"	Three-fourths pale pinkish.	Powdery white	None	"	Abundant	Very energetic granules abundant.	"	Numerous.	
41	3rd	"	Two-thirds brownish yellow.	Large grey white flocculi.	"	A few	None	A few	"	A few.	
42	5th	"	Two-thirds pale brownish grey.	Not noted	"	None	A sprinkling	Abundant	"	Abundant	A few of the circular cells were of very large size.
43	5th	Highly alkaline.	Two-thirds pale greenish grey.	White	"	Very abundant	Few	A sprinkling	"	Very abundant	
44	Not noted	Alkaline	Brownish pink.	Scanty large grey flocculi.	"	"	"	Very abundant	"	None	This was a doubtful case, and the patient suffering from chronic dysentery.
45	6th	"	One-half pale grey.	White	"	None	None	A sprinkling	"	Very abundant	Some of these were very refractive, clear, and aggregated in masses.
46	5th	Very alkaline.	Colorless	Scanty	"	Numerous.	"	Not noted	"	Very abundant.	
47	4th	"	Two-thirds dirty brownish.	Grey powdery	"	None	"	Abundant	"	A sprinkling	These cells were marked by having a very hard sharp outline. Much debris and undigested tissue present.
48	Not noted	"	Grey, turbid	Powdery	"	"	"	A sprinkling	"	Abundant	
49	"	"	Grey, watery	Large white flocculi.	"	"	A sprinkling	Abundant	"	"	Few of the circular and oval cells were clear and sharply defined. Phosphatic crystals abundant.

Table showing the Principal Characters of 100. *Cholera Evacuations*,—continued.

No. of case.	No. of evacuation in each case.	Reaction.	PHYSICAL CHARACTERS.		MICROSCOPICAL CHARACTERS.						
							INFUSORIA.				
			Fluid.	Sediment.	Epithelium.	Red blood corpuscles.	Cercomonads, amœbæ, &c.	Bacteria and Vibriones.	Fungi.	Oval and circular cells.	REMAINING CHARACTERS.
50	5th	Very alkaline.	Two-thirds watery	Powdery, dirty grey.	None	None	Abundant	Abundant	None	Abundant	Cells very clearly defined and circular.
51	7th	„	Half grey, watery	Large gelatinous pale grey flocculi.	„	„	None	A mere trace	„	„	
52	4th	„	Two-thirds grey	Powdery grey	„	„	A few	Abundant	„	„	The cells of large size, distinct outline, and refraction.
53	6th	„	Three-fourths brownish.	„	„	„	Abundant	Considerable numbers.	„	„	Many of the infusorial bodies here were freely crawling amœbæ.
54	8th	„	Grey, watery	Scanty pinkish grey.	„	„	A few	Abundant	„	A few	Much undigested vegetable tissue.
55	„	„	Very abundant, watery grey	Powdery pinkish	„	„	„	Not noted	„	Abundant.	
56	Not noted	„	Half grey, watery	Large grey gelatinous flocculi.	„	Abundant	„	Abundant	„	A few	The infusorial cells consisted of large freely crawling amœbæ.
57	7th	„	Two-thirds dirty grey.	„	„	A few	„	A sprinkling	„	Abundant	Many of the circular cells were of large size and contained several distinct included bodies.
58	Not noted	„	Transparent	Scanty, very gelatinous	„	None	None	Mere trace	„	Very abundant.	
59	6th	„	Pale greenish yellow.	Scanty, white	„	„	Abundant	A few	„	Abundant.	
60	5th	„	Two-thirds yellowish watery.	Large loose grey flocculi.	„	„	„	Few	„	Many	The majority of the still cells were dim and rapidly disintegrating.
61	Not noted	Faintly alkaline.	Thick turbid yellow.	None	„	„	None	Abundant	„	Abundant	The latter cells all marked by a double outline and clear refraction. Case in reaction.
62	4th	Alkaline	Two-thirds watery	Powdery white	„	„	Very abundant	„	„	„	These also almost all double outlined.
63	Not noted	„	Dirty brownish	Powdery	„	„	A few	Not noted	„	„	Many of the still cells of large size.
64	„	„	Not noted	Not noted	„	„	Abundant	„	„	„	
65	10th	„	Watery	Large loose gelatinous flocculi.	Very abundant.	„	None	Very few	„	„	These cells of small size and shrunken.
66	Not noted	„	„ bluish	Scanty large gelatinous flocculi.	None	„	„	A mere trace	„	„	
67	1st	„	„ greenish	Powdery	„	Abundant	Very abundant	A sprinkling	„	Very abundant.	
68	Not noted	„	„	Abundant large white flocculi.	„	None	A few	A few	„	Abundant	The still cells of small size and shrunken.
69	„	„	„ grey	Very little	„	Abundant	None	Not noted	„	A sprinkling.	
70	„	„	„	„	„	None	Abundant	„	„	None.	
71	„	Alkaline, becoming neutral.	One-half dirty brownish.	Powdery grey	„	„	A few	Abundant	„	Very abundant.	
72	„	Very alkaline.	Clear	Very scanty	„	„	„	A sprinkling	„	„	
73	„	„	„	„	„	„	None	A mere trace	„	A few	These cells double outlined.
74	„	„	Almost colorless	Scanty white	„	„	Very abundant	Not noted	„	None	The infusorial cells very rapidly disintegrating.
75	„	„	Transparent	Very little	„	„	None	A mere trace	„	A sprinkling	Cells large, circular, and granular.
76	„	„	Brownish	Powdery	„	„	„	Not noted	„	Abundant.	
77	5th	„	Two-thirds whitish.	Large loose flocculi.	„	„	Abundant	A sprinkling	„	A few	The still cells dim and indistinct.
78	4th	„	Two-thirds grey, turbid.	Powdery white	„	„	„	Very abundant	„	A sprinkling	The still cells in masses, and with double outline.
79	5th	„	Watery	Scanty	„	„	„	Abundant	„	Abundant	The still cells dim and disintegrating.
80	Not noted	„	Brownish	Powdery	„	„	None	„	„	A sprinkling.	
81	„	„	Dirty greyish	„	„	„	„	A sprinkling	„	Abundant	The cells very refractive, clear, and with hard outline.
82	„	„	Pale grey	„	„	„	Abundant	Abundant	„	„	
83	„	„	„ brownish grey.	Scanty	„	„	„	Not noted	„	„	
84	„	„	Almost colorless.	Scanty gelatinous	„	„	None	A mere trace	„	„	The majority dim, here and there masses with hard outline and high refraction.
85	„	„	Yellowish	Powdery	„	„	Abundant	Abundant	„	„	
86	„	„	Four-fifths yellowish.	Powdery white	„	„	Very abundant	„	„	„	
87	„	„	Almost colorless sp. gr. 1005.	White gelatinous	„	„	A few	A mere trace	„	„	The still cells were rapidly disintegrating.
88	„	„	Colorless, sp. gr. 1005.	Scanty large loose flocculi.	„	„	None	Not noted	„	„	
89	3rd	„	Watery	„	„	„	A very few	„	„	None	Flakes consisting of gelatinous granular matter.
90	Not noted	„	„ sp. gr. 1003.	Abundant, white powdery.	„	„	A few	Abundant	A few yeast cells and sarcinous masses.	Abundant.	
91	8th	At first slightly acid, becoming alkaline.	Pale greenish	Powdery	„	„	„	„	Yeast cells abundant.	None	This evacuation was not examined until 14 hours after passed.
92	Not noted	Very alkaline.	Colorless, transparent.	Not noted	„	„	None	A mere trace	None	Abundant.	
93	„	„	Dirty green	Gelatinous	„	„	„	Not noted	„	A sprinkling.	
94	„	Alkaline, becoming acid.	Muddy, sp. gr. 1008.	Powdery, abundant.	„	„	„	Abundant and of large size.	„	A few	Undigested tissue abundant.
95	4th	Alkaline	Pale grey, sp. gr. 1006.	Abundant, white	A few cells.	„	Very abundant	Not noted	„	Abundant.	
96	Not noted	„	Watery, clear	Scanty white gelatinous.	None	„	Abundant	A sprinkling	„	„	
97	„	„	Pale grey	„	„	„	None	„	„	„	Cells rapidly disintegrating.
98	6th	„	Not noted	Not noted	„	A few	Abundant	„	„	„	
99	Not noted	„	Watery, colorless.	Fine, white gelatinous flocculi.	„	None	A sprinkling	Not noted	„	„	The circular cells were dim and shrunken in appearance.
100	7th	„	Pale yellowish grey, sp. gr. 1005.	Abundant, gelatinous.	„	„	Abundant	A sprinkling	„	„	

Reaction.

Persistence of reaction.

Cases in which acidity of the vomited matters coincided with alkalinity of the dejecta.

141. The reaction was determined in 60 of the 100 cases. In 57 of these it was alkaline, in general very strongly so; in one it was slightly acid, becoming alkaline as the paper dried; in another it was alkaline, becoming acid; and in another alkaline, becoming neutral. In almost every case this alkalinity persisted for days, and indeed for weeks, when the examination of the material was continued so long. In one or two instances, however, acidity subsequently supervened, apparently due to fermentive changes in the portions of undigested food present. The mere presence of abundance of undigested tissues, however, by no means necessarily induced this change in reaction, as in some cases in which such materials were peculiarly abundant, the alkalinity was at the same time very persistent. In connection with the question of reaction, it is to be noted that, in one or two cases in which there was no vomiting, and in which the treatment consisted solely of large doses of acid administered by the mouth, it was found on examining the evacuations that no perceptible change had been produced in their reaction. Unfortunately no quantitative test of the degree of alkalinity was employed; but, in as far as the rough litmus test goes, no influence appeared to be exercised on the character of the evacuations. It is also noteworthy that in every instance, in a limited number of cases, in which the experiment was tried, it was found that with no administration of acid, and while the evacuations from the rectum were highly alkaline, the vomited matters were nevertheless as highly acid.

Physical characters (A) of the fluid.

Pink coloration of the fluid not necessarily associated with recognisable blood-cells.

142. The fluid was in all cases watery in consistence, and almost always of a grey color, frequently more or less tinged with a brownish, greenish, or yellowish hue. In some cases, however, it was perfectly transparent and colorless, and in others marked by more or less of a pink or reddish tinge. This pinkish coloration was distinctly visible in 11 of the 100 cases, in some of these being slight in degree and evenly diffused, in others more strongly marked and increasing in intensity towards the lower part of the fluid, so as to form a distinct red stratum immediately above the flaky matter of the sediment. Sometimes this pinkness coincided with the presence of distinct red blood-corpuscles, as revealed by microscopic examination; but on the other hand it oftener occurred without manifest blood-corpuscles, and the latter again were in some cases abundant, without imparting a trace of pink color to the fluid. In a few instances the fluid was muddy and full of fine yellowish or coffee-colored, suspended matters, but in such cases the evacuation was generally derived from a case which had already passed into the stage of reaction.

Specific gravity of the fluid.

143. The specific gravity of the fluid in six cases in which it was noted was 1003, 1005, 1005, 1005, 1006, and 1008. The smell in most cases was of the peculiar mawkish character so frequently described; but sometimes, especially where the evacuation had taken place in the early stage of the disease, it was highly offensive and putrefactive in character.

Physical characters (B) of the sediment.

Sediment composed of flocculi and gelatinous matter.

Relative proportions of sediment and fluid.

144. The physical characters of the sediment varied very considerably in different cases. Whatever its other characters might be, it almost always subsided rapidly, completely, and permanently, leaving the fluid as a perfectly distinct stratum. Only in a very few instances did a little flocculent matter remain suspended in it or floating on the surface. The color of the materials composing the sediment was, as a general rule, of some shade of grey or white, varying from a dirty grey to a pure white; but in some instances it was yellowish, in others pale brownish, in others pale neutral, and in one case of a pinkish hue. The consistence of the material varied considerably also, in the majority of cases being gelatinous, and in some so much so that portions for microscopic examination had to be cut off with scissors from the general mass. In other specimens it was more or less powdery, and almost entirely wanting in the tenacious gelatinous element. The size of the component flocculi also varied greatly in different instances, for while in some they were very large, and, as mentioned previously, occasionally so glued to one another by gelatinous matter as to cause almost the whole of the sediment to form one mass, in others they were extremely minute. The relative proportions of sediment and fluid also exhibited great variations, for although in some cases the first was only present in the form of one or two minute fragments, in others it composed as much as two-thirds of the whole evacuation. As a general rule, however, the fluid very considerably exceeded the sediment in amount. In addition to the gelatinous element and the more consistent flocculent material, the sediment, especially in those cases in which it belonged to an evacuation passed at an early period in the course of the disease, occasionally contained obvious fragments of undigested food,* and in one or two instances small portions of normal fœcal matter.

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* In one very rapidly fatal case, the evacuations contained large quantities of hard undigested rice grains.

Microscopical characters of choleraic dejecta.

Epithelium present in only 4 per cent. of the dejecta.

145. I. **Epithelium.**—In only four cases of the series was unmistakeable epithelium to be found, and in only one of these was it present in any abundance; in the others the amount was altogether insignificant. As, however, the fact that abundant and characteristic epithelial cells occasionally present themselves in choleraic evacuations is of considerable importance, it may be well to subjoin a few further particulars regarding the instance in which this phenomenon occurred.

Illustrative case, No. 65, of the table.

Perfectly distinct epithelial cells occasionally present.

146. This case was of about 16 hours' duration. During its progress four different evacuations at different periods of the disease were examined, the last having been passed very shortly before death. In not one of the three earlier evacuations was any epithelium to be seen, but in the last there was an abundance of cylindrical epithelial cells, of perfectly characteristic and unmistakeable appearance, either scattered solitary through the substance of the flocculi, or still adhering in series of greater or less extent.—(*Vide* Plate II, fig. 2, A. B.)

This small percentage not exceptional.

and not dependent on evacuations of all stages of the disease not being examined.

147. It may be argued that the general absence of epithelium in these 100 cases was merely accidental, and that by taking a larger number a different result would be obtained. To this I can only reply by stating that the results of the examination of all the choleraic materials, which I have had the opportunity of obtaining in this country, have been similar to those shown in the table. It may also be urged that the discharge of epithelium recognisable as such is a phenomenon confined to one stage of the disease; but up to the present time I have failed to discover any stage which is characterised by the appearance of epithelial cells in the evacuations, although in very many cases, a considerable number of which furnished the materials, the characters of which have been here tabulated, a systematic series of examinations was made of the evacuations passed at various stages of the disease, from a time when the greater portion of the evacuated material consisted of the debris and undigested tissues occurring in normal and diarrhœal evacuations to the termination of the case, or until the establishment of reaction.* It is of course impossible to deny that some of the gelatinous matter and molecular debris, so abundant in certain cases, may be the result of the disintegration of epithelial cells. But in connection with the theory that the material forming the sediment in cholera evacuations is mainly the result of such disintegration, it must be recollected that it is difficult on such a supposition to account in the great mass of cases for the total disappearance in the discharges of the epithelial cells assumed to be shed in such abundance in the small intestine. Did the flocculi consist of nothing but gelatinous and molecular debris, the non-appearance of the epithelium might be satisfactorily ascribed to a rapid process of disintegration, induced in the cells by the action of the alkaline fluid; but when we find them, as a general rule, full of perfectly distinct cells, which, whether they be white blood-cells, gland cells, or "bioplastic" bodies derived from the blood, are not more resistent than epithelium, any explanation founded on the assumption that they are the result of disintegrated epithelium does not satisfy the requirements of the case.

Why does the epithelium not appear in the dejecta?

Other forms of cells appear in abundance.

Disintegrative action of the alkaline fluid.

Epithelium more resistent than the cells which commonly occur.

148. That the alkaline fluid of choleraic evacuations does tend to facilitate the disintegration of most cells immersed in it, there can be little doubt; but, in as far as my experience goes, this influence acts with much greater rapidity upon the distinct, clearly-defined cells or protoplasmic bodies which usually characterize the evacuations, than upon the epithelial cells which hardly ever are to be found in them; for while the former tend very rapidly to disappear, the latter persist in a recognisable form for days, even at those times of year when the temperature of the air is high and all decomposing processes rapid, and they show no tendency to the very active disintegration which has been assumed to take place within the intestine.

The epithelium found in *post-mortem* examinations is unequivocal in appearance.

149. That the contents of the intestines, as ascertained by *post-mortem* examinations, do contain abundant epithelial cells, and in fact mainly consist of such cells immersed in a fluid like that of the evacuations, is a fact which is called in question by no one; but the cells here are clearly defined and unequivocal, and show no evidences of assuming the appearance and characters of those which are found in the evacuations. From the very limited number of examinations of *post-mortem* materials which I have had the opportunity of making, I have no grounds for founding any opinion in regard to how much of this detached epithelium is to be ascribed to a *post-mortem* or imme-

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* For this method of progressive examination, a jail, such as the Alipore Jail, from whence many of the cases examined were derived, affords greater facilities than can be furnished by any hospital, seeing that it is rarely in the latter that cases come under observation so early in the course of the disease as they do in the former.

diately *ante-mortem* process. But there always remains a possibility that a considerable amount is due to such processes, and that the absence of the cells, which I shall subsequently describe, and which, although not confined to cholera, are constantly and abundantly present in choleraic evacuations, is due to their rapid disintegration, which is of actually observed and not of assumed rapidity, as we shall see hereafter when we come to their consideration. Even a very limited number of *post-mortem* examinations may, however, show that a cholera case may prove fatal with very little detachment and destruction of epithelium, and may serve to suggest that such a process, although frequently occurring in the course of the disease or shortly after its close, may yet have no essential connection with the production of the characteristic symptoms. That the destruction of epithelium is in some cases at least very limited in extent, I cannot but believe, seeing that in several of the *post-mortems* in which I have had an opportunity of carefully examining the intestines, the evidences of destruction were confined to a small portion—about two feet in extent of the ileum, immediately above the cœcum; for while in this locality the mucous membrane appeared thinned, congested, deficient in follicles and denuded of epithelium, yet throughout the rest of the intestine there was no evidence of denudation, and the epithelial lining only differed in appearance from its normal condition in presenting a somewhat macerated aspect.

Cases may prove fatal with very little affection of epithelium.

150. The epithelium found in the intestinal contents, although sometimes very molecular and marked with distinct granules, was in other cases quite clear, and not to be distinguished in microscopic appearances from that obtained from cases dying of other diseases. The appearances of the epithelium found in various cases is shown in Plate III, figs. 2, 3, and 4. Fig. 2 shows epithelial cells from the contents of the small intestine. Many of the cells in this instance, as shown in the figure, had delicate, hyaline, bladder-like protrusions proceeding from some part of their outline. Fig. 3 shows a cast from the summit of a villus and numerous small, delicate, colorless vesicles,* at first very distinctly visible, but which were very evanescent, disappearing as red blood-corpuscles sometimes do, the only evidence of their existence which remained being a very delicate and barely perceptible ring marking their former outline. Fig. 4 shows cells from the contents of the jejunum, as well as some peculiar bodies, possibly gland cells. The epithelium in this case appeared to be perfectly normal in its characters.

Epithelium in the intestinal contents sometimes molecular, at other times quite normal.

151. II. RED BLOOD-CORPUSCLES.—In 14 per cent. of the cases tabulated, red blood-corpuscles were distinctly visible; in eight cases they were present in abundance. Their presence in some coincided with the pinkish coloration of the fluid previously alluded to, but more frequently with the common pale-grey or brownish color. The individual discs were frequently much altered in form, being distended, and elongated, oval or concavo-convex in outline.—(Plate II, fig. 3 A.) As a rule, they tended to disappear very rapidly, so that an evacuation which showed them in abundance soon after its exit from the body, frequently after the lapse of a few hours retained none in a recognisable form.

Percentage of cases containing red blood-corpuscles.

152. This rapid disappearance of the discs is curious when taken in connection with the result of an experiment, in which a portion of a clot derived from a non-choleraic *post-mortem* examination was immersed in the alkaline fluid of a choleraic evacuation; for in this case the fluid in place of appearing to facilitate the disintegration of the discs, seemed rather to exercise a preservative influence upon them, so that they persisted in abundance in it for some days after they had almost entirely disappeared from two corresponding preparations consisting of portions of the same clot immersed respectively in water, and in the serum of the blood to which it belonged. In more than one instance solitary red corpuscles were seen to be included within cells, which were indistinguishable from the other circular colorless cells forming the mass of the sediment, and furnished an apparent example of the involution of red corpuscles by these cells. The various appearances presented by the blood-discs when occurring in cholera evacuations are shown in Plate II, fig. 3 A, and those which appeared in the experiment on the artificial addition of choleraic fluid to blood-clot in Plate II, fig. 3 E. Although actual blood-discs were detected in only 14 per cent. of the cases in the table, evidences were not wanting in many others apparently indicative of the presence of their constituents as crystals.—(Plate II, fig. 6 B.) Possibly some forms of blood-crystals were frequently present in small quantities, usually appearing in preparations examined after the material had been kept for some time, but occasionally while it was still quite fresh.

Effect of the choleraic fluid on red blood-corpuscles.

153. The chief objection to laying very much stress on the presence of blood-discs in choleraic evacuations in Calcutta appears to lie in the fact that so many persons living here have a more or less decided dysenteric tendency, so that it is hard to say, from a Calcutta experience alone, how far the presence of blood is an essential and normal feature of choleraic discharges, and to what extent it may be incident

Objection to laying much stress on the occurrence of blood-corpuscles in choleraic dejecta in Calcutta.

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* These were apparently similar to those described by Dr. Burdon Sanderson as "hyaline bodies which occurred in immense numbers in the contents of the large intestines of mice" (possibly stromata of blood-corpuscles).

on a congested and unhealthy condition of the large intestine. For example, the patient from whom the evacuation No. 44 was derived was found to have been suffering from chronic dysentery previous to the supervention of choleraic symptoms, so that there can be little doubt that the large proportion of blood-discs present in the discharges was mainly due to this disease. In other cases, however, in which blood-discs formed a prominent feature in the evacuations, there was no evidence of any kind to show the presence of dysenteric or other complications to which the phenomenon might be ascribed.

The occurrence of white blood-corpuscles considered in another place.

154. It may appear strange that no mention should be made in this place of the occurrence of white blood-cells, seeing that the presence of the red discs almost inevitably implies their presence also; but it appears to be more convenient to reserve the difficult questions concerning them until we come to the consideration of the cells occurring in such abundance in the evacuations, and regarding which, while it is impossible to assert that they are all white blood-cells, it is equally impossible in many instances to point out any features by which they may be certainly distinguished from them.

Percentage of cases containing infusoria, exclusive of *Vibriones*, &c.

Three distinct types.

155. III. INFUSORIA. A.—INFUSORIA EXCLUSIVE OF VIBRIONES AND BACTERIA.—In 66 of the cases tabulated, such infusoria were present in greater or less abundance; in some cases in very small numbers, in others numerous, and in one or two forming the most prominent element in the sediment of the discharges. They presented various forms, but appeared to be reducible to three distinct types:—1, Cercomonads; 2, peculiar monadiform bodies very distinct from the previous type, and, in as far as observation goes, persistently distinct, no evidences of the transition of one form into the other having been detected; 3, distinct Amœbæ. I shall now proceed to consider each of these types in detail, with the phenomena attending their appearance in cholera evacuations, reserving the questions regarding their occurrence in diarrhœal and healthy evacuations for a separate place.

1.—*Cercomonads* most abundant.

Period of the disease in which they chiefly abound.

Rapid disintegration and disappearance.

Probable cause of variations in persistence.

156. The *cercomonad* type is certainly by far the most abundant and constant of those occurring in the evacuations of cases of cholera developed in Calcutta, and this is the case, as far as my limited experience goes, throughout the greater part of the Lower Provinces. Frequently they are the sole representatives of unequivocal infusoria (beyond bacterial and vibrionic bodies) present, while in other cases they occur in greater or less number, associated with bodies belonging to the two other types. They, as well as the others, are not confined to any particular stage of the disease, but are found occurring from the commencement of the case to its close, and occasionally in extreme abundance in the contents of the intestines after death. As a general rule, they appear in greatest numbers during the middle of the case, occurring in comparatively small numbers in the earlier evacuations, increasing in abundance as the disease advances, and finally diminishing or totally disappearing towards its close. The length of time in which they persist in any given evacuation varies greatly, for in some cases, although very abundant and of great activity when the material in which they were present had been very recently passed, they became motionless, and even totally disintegrated within a very short time, so that an evacuation, which when freshly passed afforded specimens showing them in abundance in every instance, after the lapse of an hour or two gave no evidences of their presence, or at least failed to show any of an unequivocal and characteristic appearance. In other cases, however, they remained in full activity, and in undiminished, if not increased, abundance for several days, only disappearing gradually with the advance of decomposition in the surrounding medium. The process of disappearance could in some instances be actually witnessed in a preparation while under observation, individual cells being seen to change their forms, become motionless, and shrink or absolutely break up into small heaps of amorphous granular matter. These variations in periods of persistence probably are dependent on changes in the nature of the surrounding medium, for changes precisely similar to those occurring in the cells in the natural fluid are frequently observed to follow the addition of re-agents, or even the slight change induced by the addition of a little water to it.

157. Putting aside the ordinary normal changes of form observed in individual cells, there still remain two forms to be distinguished from one another, connected no doubt by insensible gradations, but yet very distinct as occurring in the extreme members of the series.—(Plate IV, Fig. 1 A. B.)

Characters of commonest form.

The first, and possibly the most prevalent, of these is mainly distinguished from the other by a fusiform outline, a homogeneousness of substance, a very distinct flagellum, and the power of protruding extensions from its body. The cells are usually colorless, but occasionally of a more or less pronounced greenish or yellowish hue. They show no contractile vesicle, but vacuoles and one

Caudal process subject to complete retraction.

Appearance of pseudocilia.

or two minute granules or dark points are sometimes to be seen in their substance. At the posterior extremity is a delicate, variable process in the form of a tail, which is capable of adhesion to neighbouring bodies, and thereby of serving as a point of support during the energetic movements of the cell. The length of this process varies greatly at different times, but it appears to be subject to complete retraction, and in fact to constitute merely a somewhat differentiated member of the series of protrusions which the body-substance of the cercomonad is capable of emitting. Whatever its actual nature may be, there can be no doubt that it is of considerable tenacity, as cells may frequently be seen energetically swimming about and dragging after them, by means of their tails, masses of extraneous matter considerably exceeding them in bulk. While in a condition of full activity, the cells, in addition to showing a flagellum and tail, often present an appearance of being provided with cilia along one or both lateral aspects. This appearance of ciliation is however quite deceptive, in as far as it leads to the supposition of the existence of true or permanent cilia, for it is due to the rapid wave-like protrusion of portions of the body-substance. As the activity of the cell diminishes, these protrusions become more manifest, not only on account of diminished, rapidity, but by reason of increased size.—(Plate IV, fig. 1.) These figures show the changes of form actually observed to take place in one cell while under observation, and as these changes are on the whole typical of those ordinarily occurring, I subjoin an abstract of notes regarding them which were taken at the time of the observation.

Changes observed to take place in one cell.

Movement of the protrusions.

Disappearance of the flagellum.

Final disintegration.

A common active oval *cercomonad* was kept under observation for three hours with the following results. When first observed it had a distinct flagellum and tail, and was moving actively by means of the former and a series of fine pseudocilia along the margins of the body. Presently the tail disappeared and the body began to emit large protrusions in place of the finer ones previously employed. These protrusions were either slightly raised conical elevations, passing in a wave-like manner along the margins, or were distinct elongated processes. When merely slightly elevated several protrusions frequently occurred simultaneously, but when elongated they were, at least in a fully developed form, invariably solitary. Even where several protrusions occurred simultaneously, they were usually limited to one side of the body, but occasionally they were present on both sides. The movement of the individual protrusions was from the flagellar to the caudal extremity of the body, but each new protrusion was emitted anterior to the previous one. The action of the whole series was of a more or less rowing character, serving to propel the body forward through the fluid in the direction of the flagellum. When fully developed the processes appeared to be shot out with a considerable amount of force, at first as conical projections, but rapidly running out and becoming slender, in some cases to such an extent as to form a long delicate thread, while the sarcode appeared to have a tendency to accumulate at the distal extremity, giving the whole process a more or less capitate appearance. When the process had reached its maximum extension, a momentary pause ensued, and then the apex was swept round towards the caudal extremity of the body, the base at the same time moving slightly in the same direction. During this movement the process was gradually retracted and disappeared, and a new one was shot out anteriorly to go through the same cycle of changes. After some time the flagellum disappeared, and the body remained moving by means of protrusions alone, which when wave-like seemed to run all round it. Gradually the protrusion of elongated processes ceased, and only a progressively diminishing wave-like action persisted, the body at the same time becoming somewhat shrunken, and showing a faintly marked double outline. During all this time changing vacuoles had been very distinct, and now one or two granules came clearly into view in the interior of the body. Presently all movement ceased, and the cell appeared as a minute, oval, shrunken body. After remaining in this condition for a short time it seemed to swell out, became circular, and in few minutes broke down into a patch of fine granular matter, containing one or two large refractive granules, and quite indistinguishable from the surrounding granular debris.

Characters of the second variety of *cercomonad.*

They hardly ever emit protrusions.

158. The second variety of *cercomonad* (B) is distinguished by being usually of a fusiform figure, coming to a point posteriorly, and being abruptly rounded off anteriorly, by showing neither a visible flagellum nor distinctly developed protrusions of body-substance, and by being always decidedly molecular, softly shaded and marked by distinct and often prominent granules. The individual cells vary very much more in size than those previously described, being in some cases extremely minute, and in others twice the size of that figured.—(Plate IV, fig 1 B.) Their movements are in general much less energetic than those of the previous form, or they comparatively seldom attach themselves to surrounding bodies by their posterior extremities, and hardly ever, in as far as my observations go, emit the protrusions so characteristic of the former variety. They sometimes co-exist with that variety, and at others appear to replace it almost entirely.

Processes of multiplication and probable identity of nature.

159. Both forms are capable of rapid multiplication by a process of transverse division, and both are probably mere varieties of one species, being variations due to peculiarities in the nidus in which they are developed, or normal developmental stages occurring independent of extraneous influences.

They may be mistaken for epithelial cells.

160. Perhaps the most important and interesting point in connection with the second form is the fact that, owing to their size and general aspect, specimens of it may readily be mistaken for cylindrical epithelial cells. Of course, as long as their characteristic jerking and rotatory movement persists, this mistake cannot be made, but I have frequently seen

cells which, had they not been actually observed to pass from the active condition into a state of quiescence, could not have been distinguished from imperfect epithelial cells without the employment of re-agents.

They occasionally present a circular figure.

161. Occasionally, along with cells of the normal characteristic form, others are present in differing proportions, which show various degrees of deviation from a pyriform contour, to such an extent in certain instances as to cause them to become quite circular. These circular cells retain the normal molecular shading and distinct granules, and move apparently by means of a delicate flagellum, which although itself invisible manifests its presence by the effects which its movements produce on the fluid and the surrounding solid bodies. Occasionally also these circular, or, more correctly speaking, globular, cells present an appearance of ciliation which is apparently due to the rapid action of minute protrusions of the body-substance, like those so frequently occurring in the previous variety. The cells however, whether globular or pyriform, never emit elongated protrusions.

2. *Monads* of perfectly distinct characters from the common cercomonad.

162. The second monad form is distinguished by very definite characters, and shows no tendency to transition towards those of the common *cercomonad*.—(Plate IV, fig. 2.) The cells are more or less flattened and of a spathulate form, presenting two distinct surfaces and a narrow intervening margin. One of these surfaces is convex, the other flattened or slightly concave. At the pointed extremity of each cell is a very delicate filament, and near the same point on the concave surface, a few minute cilia or cilioid processes are sometimes visible, moving rapidly in the direction of the caudal extremity. All of the cells are colorless, and most of them almost diaphanous, showing merely faint vacuolation. A few of them, however, show distinct granules in their interior. As a general rule, they are neither so constant nor so vigorous in their movements as the common *cercomonad*, frequently lying for a considerable period entirely at rest, save as regards their cilia, and more especially as regards their flagellary processes, which are usually kept in gentle motion; occasionally, however, they move through the fluid generally with their broad extremity foremost, at the same time rotating on their long axes. Perhaps the most curious and characteristic of their movements is an occasional downward flexion of the posterior pointed portion of the cell upon the anterior expanded part. This movement is utterly unlike anything observed in the common *cercomonad*. It varies greatly in extent and rapidity, being in some cases so slight as to cause only a faint increase of the normal concavo-convex curve of the cell, in others so great as to approximate the two portions of the body to one another; sometimes very slow, and at others rapid and of an energetic wagging character. When these movements are well pronounced, they serve to propel the body onwards in the direction of the broad anterior extremity. In no instance was a cell observed to attach itself by its posterior filament, or to use it in any way as a point of support.

Character of their movements.

Not so frequent as the cercomonad.

But occasionally present in great abundance.

163. They do not appear nearly so frequently as the common *cercomonad*, and the most remarkable feature in connection with them is the extreme profusion with which they occur in certain cases, abounding to such an extent occasionally as to form by far the most prominent and characteristic feature in the discharges. Two of the cases included in the number of those from which the table of characters was compiled showed this infusorial form in great abundance, and I shall here append the notes taken in regard to one of them at the time of observation. The series of evacuations from this case began with No. 62 of the table.

Case in which they occurred in extreme profusion.

CASE II, No. 62, OF THE TABLE.—*Case in which a peculiar form of monad occurred in very great abundance.*—The patient was admitted shortly after the commencement of symptoms of the disease. Before admission he had passed three evacuations, and that first examined was the 4th.

Microscopic characters of the 4th evacuation.

1st.—4th Evacuation.—This consisted of a whitish, watery fluid, and a white powdery sediment. The sediment was completely separate from the mass of the fluid, formed about one-third of the bulk of the whole evacuation, and showed a few small portions of undigested food towards the bottom of it. The reaction was strongly alkaline, and the smell faint and mawkish. Microscopic examination afforded the following results. The fluid contained a considerable amount of active bacterium, and the flakes were full of granular débris and undigested vegetable tissues. Everywhere throughout both flakes and fluid there were numbers of cells of various kinds. 1st.—The most numerous cells present consisted of active *cercomonads* of the second variety, and both oval and circular in form. 2nd.—In point of abundance were numerous, very refractive oval and circular cells, all motionless and showing a very distinct double outline. 3rd.—Numerous active and still spathulate *monads* of various sizes. The active specimens were seen swimming through the fluid, revolving on their long axes and progressing sometimes in the direction of their rounded, and at others in that of their pointed, extremities. 4th.—Circular cells of various sizes, showing no evident nucleus, but containing granules of various sizes. Not a trace of recognisable cylindrical epithelium.

2nd.—5th Evacuation.—The general characters of this were identical with those of the 4th, save that the sediment only formed about one-fifth of the whole bulk. The microscopical characters were also similar to those of the previous one, but the flakes contained much less vegetable tissue, and the cells, especially the small active spathulate *monads*, were present in considerably increased numbers.

3rd.—6th Evacuation.—This was almost identical in characters with the 5th, but at the bottom of the sediment there were one or two totally undigested *dhâl* grains. Active circular *cercomonads* were present in great abundance.

4th.—8th Evacuation.—This was identical in characters with the 6th evacuation, but full-sized, active and still spathulate monads were present in greatly increased numbers, in both flakes and fluid.

Rapidity of disintegration.

5th.—9th Evacuation.—This consisted of a large quantity of almost colorless fluid, and a scanty sediment of distinct white gelatinous flocculi. The reaction was alkaline, and the smell mawkish. At the bottom of the sediment were a few totally unaltered grains of *dhâl*. Microscopic examination afforded the following results. The fluid was quite clear, and contained a mere trace of *Bacterium*. It was everywhere full of spathulate monads of average size. Many of these exhibited the characteristic flexion movements, others were motionless, but still retaining their characteristic form and clearness of outline, while others showed various degrees of endosmotic swelling and disintegration. None of the small active cells so abundant in the first evacuation of the series were to be detected. There was no evidence of the presence of epithelium either here or in the flocculi, and only a few granular, circular cells. Wherever a portion of any of the flocculi was thinned sufficiently by pressure to render its structure manifest, it was found to consist of a minutely molecular gelatinous basis, in which myriads of spathulate *monads*, and a few molecular circular cells were embedded. Many of the former bodies were still active, and those which were not were easily recognisable from their peculiar form.—(Plate IV, fig. 2.) Even while under observation, the process of disintegration proceeded rapidly; those cells which were at first active becoming still, and the still ones becoming more and more ill-defined and dim, until they were utterly indistinguishable, and all that remained was a layer of gelatinous material in which molecular and granular matter was irregularly distributed. On the following day specimens of the same evacuation were again examined, but they were then so thoroughly disintegrated as to retain no characteristic features, and showed merely amorphous gelatinous flakes strewn with granules, and at rare intervals including more or less recognisable cells.

3. Amœbæ—Plates II, fig. 1, B, IV, figs. 4, 5, 6.

Impossibility of laying down an accurate line separating true amœbæ from amœboid cells.

164. There is a considerable amount of difficulty and numerous sources of fallacy to be encountered in proceeding to the consideration of *Amœbæ*,* and of the facts in connection with their occurrence in choleraic evacuations. It is hardly possible to estimate with any exactness the percentage of cases in which such bodies occur, and the proportion in which they are present in any given case, seeing that no definite line of demarcation can be laid down which shall clearly separate undoubted *Amœbæ* from cells proper to the human organism and which exhibit amœboid movements. There appears to be no test by which they can be distinguished from one another, and no characteristics peculiar to the latter bodies which the former cannot assume. Still there can be no doubt that there are cases in which cells which may be properly designated *Amœbæ* do exist, for although these cells do not exhibit contractile vesicles as the higher *Amœbæ* do, neither do many of the *Amœbæ* found in infusions of various kinds do so, and their movements are not confined to changes of form and emission of protrusion, but in addition to these involve free progression through the media surrounding them.

The distinction must be more or less arbitrary.

The fact of the existence of such bodies complicates the questions regarding the nature of the corpuscles, which I believe, although not peculiar to cholera, are constantly found in this disease to an extreme degree; for until some test be discovered which shall absolutely distinguish the former from the latter, it is clear that any decision regarding the amount of bodies in any given case, which are to be regarded respectively as extraneous *Amœbæ*, and as intrinsic corpuscles resulting from the development of cells or bioplastic elements proper to the organism, must be more or less arbitrary and dependent on assumption. It would be absurd to pronounce authoritatively that one portion of sarcode, bioplasm, or whatever it may be styled, is extraneous, because it moves freely and crawls from one field of the microscope into another; and that another similar mass is intrinsic, because it merely shows changes of form and emits pseudopodal protrusions; for although the latter class of cells may be incapable of assuming the more developed activity of the former, it is a matter of constant observation that the former, at certain times and under certain conditions, may pass into a state of partial quiescence, losing the power of free progression, and not regaining it while under observation, or even during the remainder of their existence. In the meantime, the safer course appears to be to note those cells alone as *Amœbæ* which are actually observed at some time or other to be endowed with the power of free progression.

Numerous choleraic evacuations contain freely-moving amœbæ.

165. Even, however, if this classification be rigidly adhered to, we find a considerable number of choleraic evacuations, in Calcutta at all events, in which *Amœbæ* are present in varying numbers. In 18 per cent. of the cases tabulated, unequivocal freely-moving *Amœbæ* were present. All the description which can be given of them is that they consist of portions of bioplasm of various sizes, capable of independent existence and of free progression. They are colorless and softly shaded, containing a varying amount of molecular matter and of distinct granules. The consistence of the body-substance appears to vary considerably, in some cases appearing almost diffluent, in others of firmer texture and greater refractiveness. In some cases more or less distinctly marked vacuolation can be observed. When in full activity they appear to be unprovided with any attempt at a cell wall, as protrusions are emitted from all parts of the body indifferently, but they are capable of

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* In strict accuracy the bodies occurring in choleraic dejecta are rather Protamœbæ than Amœbæ.

passing into an encysted condition, and when in that state show an appearance of differentiation of cell and contents. This differentiation is, however, mainly a matter of appearance, as in those cases in which there is a resumption of activity, there is no apparent rupturing of the cyst, but a mere process of softening and absorption of it into the body-substance.

These can multiply by gemmation.

Various appearances resulting from this process of gemmation.

166. They can multiply by a gradual process of self-division, in the progress of which the new cells or bioplastic masses may be separated at once, or may adhere in clusters or series of partially united bodies. When in series they frequently very closely resemble Hallier's macroconidial chains.—(Plate VI, fig. 6 A.) The varying degrees to which the process of division has proceeded in individual *Amœbæ* gives rise to many variations in form of the resulting solitary or associated cells. In some cases we find figures of eight-shaped bodies, in others large cells with bud-like protrusions proceeding from them, and in others again we find masses of small cells, the individuals in which are rendered more or less angular by mutual pressure. When the cells are fairly separated by division, they also vary considerably in appearance, some being quite circular, others more or less cupped at one or two points, and others having their contents shrunken to a greater or less degree; the outer covering or cell-wall being widely separated from them, apparently as the result of an endosmotic action. These processes of division are merely cursorily alluded to in the present place, as they may be more advantageously discussed in connection with certain experiments, the details of which are given in the sequel.

Variations in duration probably due to variations in the medium.

167. As a general rule, the *Amœbæ* in any evacuation do not persist in a recognisable form for any length of time. Occasionally, like the cercomonads, they disappear in the course of a few hours. Usually a few are still to be detected after the lapse of 24 hours, but it is rare to find any of an unequivocal nature at the close of 48 hours. The variations in duration are probably, as in the case of the cercomonads, dependent on changes in the condition of the media by which the cells or masses are surrounded. They seem to disappear, due to a process of disintegration which resolves them into patches of granular matter, quite indistinguishable from the surrounding debris. While still in activity they are sometimes observed to part with granules. These are either solitary or in pairs, and when free occasionally exhibit an activity and energy of movement which can hardly be considered merely molecular; whether they are to be regarded as the elements of a new generation of amœbæ, or as extraneous bodies, must as yet remain a matter of doubt.

168. The following are the notes recorded at the time of observation regarding an evacuation (No. 95 of the table) in which freely crawling *Amœbæ* formed a prominent feature.

Illustrative case.

Extreme abundance of *Amœbæ*.

CASE NO. 1.—EVACUATION IN WHICH AMŒBÆ FORMED A CHARACTERISTIC FEATURE.—(Plate IV, Figures 4, 5, 6.) The specimens consisted of the 4th evacuation passed in the course of the case. It was composed of a pale, greyish, watery fluid with an abundant white sediment composed of fine flocculi. The sediment subsided rapidly and completely, but after some time a little froth and a few small flocculi rose to the surface. The reaction of the fluid was neutral, becoming alkaline as the paper dried; its specific gravity was 1006, and the smell offensive. The results of microscopic examination were as follows:—Throughout the sediment there was much debris, consisting of undigested cells of *dhâl* and other vegetable cells and tissues, with numerous oil globules, &c. Everywhere there were great numbers of cercomonads of both forms, many of the molecular pyriform variety being of large size. There was also a very great abundance of still circular cells present. These were either scattered or in masses, and aggregations of various sizes, and were either softly molecular or more or less distinctly marked with a double outline. In addition to the circular cells, various bodies of a figure of 8 shape were present in considerable numbers. By far the most striking and characteristic feature of the material was the great abundance and development of the *Amœbæ* present. The majority of them were of very large size, contained numerous granules, and occasionally showed vacuolation very distinctly. Sometimes they crawled freely from field to field, at others they remained at rest, or only changed form and emitted protrusions without altering their positions. Occasionally some of them showed a nuclear-like body in their interior, but this was seemingly due to a merely temporary and partial condensation of the sarcode, as at other times the same cells showed no evidences of the existence of any such structure. After some time some of the cells passed into lobulated masses (Plate IV, figure 5, A), others became encysted, and others disintegrated and disappeared.

Changes taking place in them.

Appearances presented by the amœbæ after 24 hours.

169. On the following day this evacuation was again examined and one preparation kept under observation for five consecutive hours. The re-action of the fluid was, when first applied to the paper, faintly acid, becoming as it dried strongly and permanently alkaline. Very few monads remained active, and those still moving were very feeble. Hardly any Amœbæ or encysted cells remained intact, their presence being now chiefly indicated by mere molecular globular bodies, and more or less perfect granular rings.—Plate IV, fig. 5 B). Disintegration was proceeding rapidly, and abundance of semi-disintegrated and distended cells were everywhere present.

Two large amœbæ were seen which still retained the power of changing form and even of moving slightly. The changes taking place in these were carefully observed.—(Plate IV, fig. 6.) The first (A) was at first oval, with a circular protrusion of molecular appearance at one extremity. This protrusion was by degrees completely separated, and the mother cell became

Changes observed in one cell.

As compared with those in another.

almost circular and double outlined, while the detached cellule floated off in the fluid. Presently another protrusion was emitted and then partially retracted. After this the cell remained motionless and gradually lost its double outline and refractiveness, becoming at the same time flattened and distended to a considerable degree by the imbibition of fluid. The result of the latter process was that a transparent space appeared between the cell wall and the shrunken molecular protoplasm. After this, disintegration and dimming proceeded rapidly, so that at the close of four hours from the beginning of the observation the sole evidence remaining of the presence of the amœbæ was a mere molecular ring surrounding a dim molecular circular mass. The process in the case of the second (B) was different, for, after going through various changes in form, it finally ceased moving and assumed a firm, encysted aspect. This, however, it did not retain long, for with a certain degree of suddenness it passed into the form of a molecular, granuled, globular mass, which soon became a mere amorphous flake of molecular matter.

Points of interest regarding the amœbæ.

They may be mistaken for epithelial cells.

170. The principal points of interest in connection with the occurrence of amœbæ in the evacuations of cholera appear to be the following:—*1st*, that they may, when in a partially or totally quiescent condition, be confounded with cells or bioplastic bodies intrinsic to the human organism, but capable of changes in form and other bioplastic movements; *2nd*, that they may, and actually do, in the processes of self-division give rise to bodies resembling the spores and chains of macroconidia described by Professor Hallier as occurring in one of the evacuations which he examined (*vide* infra); *3rd*, that in the course of a cursory examination small specimens may be readily taken for cells of intestinal epithelium, as, when they are fully extended, and at the same time only moving very slowly, they are capable of presenting appearances very similar to such cells.

Possibility of the existence of a developmental relation between the amœbæ and cercomonads.

171. One very interesting question regarding these amœbal cells is, whether they have any relation to the monadiform bodies previously described. In the course of my observations I have never been able to detect any positive evidence of the existence of any organic connection between them as I have never witnessed the direct or indirect transition of one form into the other; at the same time, however, judging from analogy, it appears to be quite possible that a genetic relation may exist. This possibility was strongly suggested by the results of several series of observations on the developments occurring in aqueous solutions of choleraic dejections; for although in these, as in every other similar series, there was no reproduction of bodies precisely similar to those occurring in the recent evacuations, yet there was a very distinct development of amœbæ and monads which were undoubtedly members of one genetic cycle.

172. As details of this set of observations may be of some interest, I append a short abstract of the notes regarding one specimen in which such development took place:—

Development of amœbæ and monads in solutions of choleraic material.

Lobulation of the film and appearance of cellules in it.

Fully developed amœbæ.

Escape of monads from cells resulting from the encystment of amœbæ.

On the 12th September 1869 a small quantity of a fresh cholera evacuation was introduced into a clean porcelain capsule, and one ounce of tank water which had been subjected to prolonged boiling and allowed to cool was added to it. The preparation was then set on a metal tripod beneath a bell glass which dipped into a solution of permanganate of potash all around. Specimens from the film which formed on the surface of the water were examined daily with the following results:—13th September.—Numerous delicate fragments of film had appeared on the surface. These on examination appeared to be formed of molecular and bacterial bodies embedded in a layer of gelatinous matter, which here and there showed thicker portions tending to cause a certain amount of lobulation of the film. 14th September.—The film was now universal and continuous over the whole surface. In some places it was of considerable thickness. On microscopic examination it showed myriads of active *Bacteria*, masses of *Zooglœa* and much gelatinous lobulated matter. 15th September.—The film was of increased thickness and strewn with distinct granules. A few large vibriones present. 16th September.—The lobulation is now highly developed. When the gelatinous basis of the lobuli was thinned out by pressure and examined with a $\frac{1}{12}$-inch object glass, it was found to contain numerous very minute circular and oval bodies, each of which appeared to contain within it a highly refractive granule (*vide* Plate V, fig. 3). They were solitary or in small aggregations or series. In the spaces between the flakes of gelatinous matter there were swarms of minute and active bacterial particles. 17th September.—The cellules were present in increased numbers, and many of them were of larger size than those observed on the 16th and 18th September. Some of the cellules exhibited more or less decided amœboid movements. 20th September.—The gelatinous lobules were crowded with fully developed *Amœbæ*, many of which were slowly making their way out and crawling freely, or showing changes of form in the surrounding fluid (*vide* Plate V, fig. 4 A). 21st September.—The amœbæ were encysting themselves in great numbers, the process being observed to take place in specimens under observation. 22nd September.—Hardly any unencysted specimens remained, and the flakes were full of cysts scattered or in masses (*vide* Plate V, fig. 4 B). 23rd September.—The flakes were densely covered with encysted cells, which when in masses had frequently a more or less pronounced yellow tinge. A certain number of active amœbæ were still present. 24th September.—Oval and circular monads were present in small numbers (*vide* Plate V, fig. 4 C). 25th September.—The escape of similar monads from some of the encysted cells observed. 26th September.—The monads were now present in abundance, and numerous empty cyst-cells were to be seen. The process of escape of the monads seemed sometimes associated with rupture of the walls of the cyst, in others with gradual softening of them. 27th September.—The number of monads was increased and that of full cysts decreased. 28th September.—Very few cysts were now persistent. Discharge of active granules from, and disintegration of monads was observed to take place. 1st October.—The monads were now rapidly disintegrating and a new delicate film of molecular matter had begun to appear in the interspaces of the portions of the original one. 7th October.—Very few monads remained persistent and the new film was of increased thickness. 8th October.—No monads were now to be found, and the surface film showed merely the appearances presented at an early stage of the series of observations, *i. e.*, a delicate, gelatinous basis full of minute *Bacteria* and molecular matter, and abundantly besprinkled with granules. The process originally observed was now repeated, and on the 13th of October the flake contained a new generation of *Amœbæ*. On this occasion, however, it contained in addition patches of elongated motionless cells, which were subsequently developed into filaments. On the 16th monads began to re-appear. The fluid and sediment now gradually acquired a distinct pinkish hue, and on the 23rd hardly any surface film persisted; the very faint film present showing abundant *Bacteria* and one or two monads, while the sediment contained an abundance of green encysted algoid cells.

Renewed formation of a film.

And of a new generation of amœbæ.

One mass of free bioplasm resembles another.

173. The statement made at the beginning of this account of developments in solutions of choleraic material, that bodies exactly similar to those of the evacuations had never been observed to be developed, must of course be understood as applied to the monads alone, as many mass of mere amœboid matter cannot be distinguished from one another in any way. In cases also in which the purely choleraic materials unaltered by the addition of water or any other medium were subjected to frequent examination during periods of weeks, there was no re-development of monads identical in characters with those originally present, and in only one instance was there any development of amœboid cells. In this instance after the evacuation had remained for several weeks untouched in a tightly stoppered bottle, it was found to be covered with a delicate film in which enormous numbers of amœboid cells of various sizes and in different conditions of activity, rest, and more or less decided encystment were present. The appearances of the encysted and resting cells is shown in Plate V, figure 5, from which it will be seen that they presented a very close resemblance to the cells of a similar nature in the recent evacuations of certain cases. Although kept under observation for weeks, they were not observed to undergo any further development, but remained almost unaltered. The fluid in which they were present remained all along strongly alkaline in reaction. It will be understood that this instance is not quoted as proving the reproduction of *Amœbæ* identical in their nature with those originally present, but merely as an example of an unusual development occurring in a choleraic material, for, as was previously remarked, one mass of bioplastic matter is just like another, and in order to ascertain the specific distinctness or identity of any two, their life history must be followed out.

Case in which there was a development of amœboid cells in an unmixed choleraic evacuation.

Necessity of caution in statements regarding *Bacteria* and *Vibriones*.

174. B.—BACTERIA AND VIBRIONES.—As regards the occurrence of *Bacteria* and *Vibriones*, together with the "micrococcus" and leptothrix of Professor Hallier, there are many points in regard to which statements must be made only with the greatest reservation, seeing that our knowledge of the exact nature and relations of many of the bodies which may be included under these terms is extremely vague and imperfect. There are, however, certain points in regard to which positive statements have been made which do not involve the obscure question of the specific nature of the bodies under consideration, but which refer entirely to the results of observation. On such matters the facts derived from an extended investigation have a direct bearing.

No evidence of peculiar profusion of such bodies in choleraic media.

They develop abundantly in decomposing choleraic media.

175. Statements have been frequently made tending to a belief in the existence of a peculiar development of *Bacteria*, *Vibriones*, &c., in choleraic as contrasted with other materials. In as far as my observations have gone, they do not at all tend to support any such belief; for, 1*st*, as regards the fresh evacuations, in very many instances I have found the bodies in question showing a minimum of development, and the result of progressive series of observations on evacuations occurring during the course of cases of the disease have on the contrary tended to show that the more any member of such a series loses the characters of common diarrhœal materials and assumes a truly choleraic aspect, the more do bacterial elements tend to diminish in numbers and development. There are no doubt cases in which such elements are abundant in the evacuations, even at an advanced period in the progress of the disease; but this, in many instances, as Dr. Lewis has well pointed out, appears to be mainly dependent on a retention of the effused fluid within the intestines for some time, so that processes of decomposition have become established in it; 2*nd*, in any choleraic material which is kept long enough to allow of the establishment of decomposition, there is of course a considerable development of the usual accompaniments of such a process, but certainly by no means a peculiar development, or one in any way differing, in outward aspect at least, from that occurring in the evacuations of many cases of simple diarrhœa, or in other fluid media highly charged with organic matter.

176. It is of course possible that, although there is no unusual development of *Bacteria*, *Vibriones*, &c., in point of numbers, the bodies which are developed may be specifically distinct. All

that can be said in reply to this is that there is no proof of any such special character, for the bodies in choleraic materials certainly differ in no appreciable degree in aspect from those found in other decomposing fluids, and experiments on the development of fungi and other organisms as a result of cultivations of choleraic materials have not tended to any other conclusion, for not only has the specific cholera-fungus of Professor Hallier entirely failed to appear in such cases, but also only those forms have been developed which were generally prevalent on other decomposing organic materials in the locality where, and in the season when, the experiments were tried. Ideas regarding peculiar abundance and high development of bacteria, vibriones, &c., as a characteristic feature in choleraic materials, appear to have arisen from such materials having frequently not been examined until decomposition had commenced in them, and from want of sufficient comparison of the appearances presented by them with those occurring in common diarrhœal and other animal fluids.

No evidence of the existence of peculiar *Bacteria*, &c., afforded by cultivation experiments.

177. Numerous experiments were tried regarding the influence of various re-agents on the development and activity of bacterial elements in choleraic and diarrhœal fluid. As a general rule, anything which decidedly altered the chemical re-action of the fluid experimented on, caused cessation of movement, and to all appearance, at least for a time, retarded the development of *Bacteria*. In experimenting with the alkaline fluids of cholera, artificial increase of both alkalinity and acidity produced this effect, while rendering the acid fluid of common diarrhœa alkaline produced a similar result.

Influence of re-agents on the development of *Bacteria*, &c.

178. In regard to the obscure questions concerning the development of higher organisms from *Bacteria, Vibriones*, &c., I can say very little from actual observation, and can only state that I have seen bodies resulting from the discharge of the contents of oscillatorial tubes behave as *Bacteria*, and distinct fungal cells arise by the gradual development of minute particles agreeing with Hallier's description of micrococci. The general results of all my observations and experiments on these points may be stated briefly as follows:—*1st*, there is no special abundance or development of *Bacteria, Vibriones*, &c., in choleraic evacuations; *2nd*, there is no specific variety of any of these bodies which can be distinguished as peculiar to choleraic materials; *3rd*, there is no development of any special organisms, either as regards form or abundance, associated with the cultivation of choleraic materials.

General results derived from observations on *Bacteria* and *Vibriones*.

179. IV, FUNGI.—In only 3 of the 100 cases tabulated did fungal elements form an appreciable characteristic. With regard to the remaining 97 evacuations, when it is stated in the table that no fungi were present, it is not intended to be understood that throughout the whole of the materials one or two isolated cells may not have been present, but only that no distinct unequivocal specimens were observed as characteristic features in them. It is most probable that, if it were possible thoroughly to examine the whole of the materials of every evacuation, a few isolated spores or other fungal cells might be found in very many of them, as well as anywhere else, and as well as distinct isolated algal cells, desmids, diatoms, *Pediastra*, &c., which are occasionally to be detected in choleraic and diarrhœal materials; but it certainly is extremely rare to find fungal cells in any abundance, and showing any distinct evidences of vitality and multiplication.

Percentage of cases containing fungal cells.

A certain number of fungal cells may occur accidentally, as algoid cells occasionally do.

180. In the first of the three cases in the table the fungal elements consisted of sarcina. Sarcinous masses of various sizes were present in considerable quantity (Plate II, fig. 4 B). These masses did not differ from those found on other occasions in choleraic evacuations, not included in the present table, as well as frequently in cases of diarrhœa. The case from which the material was derived was a slight one, and the evacuation, in addition to containing sarcina, was not characteristically choleraic in various features, both chemical and physical. The second case (No. 91 of the table), in which the evacuations were characterised by the presence of fungal cells, differed from the former in containing abundant yeast cells in place of sarcinæ. The presence of these cells was of comparatively little interest, as the material containing them was not examined until 14 hours after it had been passed, so that there had been ample time for the development of fungal cells in it after it had left the body. Whether actually developed within the body or not, the cells showed no manifest peculiarities in appearance, and on cultivation gave rise to no special form of fungus distinct from those occurring on diarrhœal evacuations and other decomposing organic materials at the same period and under similar circumstances. In the third case (No. 90 of the table) both yeast cells and sarcinæ were present. The evacuation was passed by a patient in the General Hospital and was examined immediately. The following are the notes recorded at the time of examination:—

Cases in which fungal cells were present.

Sarcinæ.

Yeast cells.

CASE No. 90 OF THE TABLE.—The patient was a sailor who belonged to a ship which had only been five days in port. The evacuation consisted of a watery fluid of highly alkaline re-action and of an abundant sediment of pale-grey powdery

Illustrative case.

Sarcinous masses and yeast cells.

Peculiar cysts.

material and white gelatinous flocculi. The specific gravity of the fluid was 1003. The fluid was full of active bacteria, very few clearly defined cells of any description were to be seen, and the whole material appeared to be in an active state of change. The flakes were full of oval and circular cells of various sizes, but the greater number of these were dim and ill-defined. The only active cells were a few large *Amœbæ* of various sizes. One of these was kept under observation for two hours. For some time it crawled from field to field showing every degree of form-change; by degrees its movements slackened, and ultimately it became circular, molecular, and comparatively dim, remaining in the flake in which it was then situated as a mere still circular cell indistinguishable from many of the cells originally present in a similar condition. In the flakes there were also present a considerable number of sarcinous masses and a few yeast cells, with considerable numbers of partially digested portions of vegetable tissues. The evacuation was reserved in a tightly stoppered bottle and was examined on the following day. The re-action remained alkaline, but the alkalinity was not so strongly marked as on the previous day. The surface of the fluid was covered with a dense layer composed of active *Bacteria* and short energetic *Vibriones*, and all throughout the material there was an abundance of similar bodies. The flakes were entirely disintegrated, and sarcinæ and yeast cells abundant. Among the debris of the sediment a scanty sprinkling of peculiar cells or cysts were present (*vide* Plate II, fig. 4 D), of different forms and containing in their interior a varying number of refractive masses and granules. No such bodies were visible in the specimens examined on the previous day, and no satisfactory clue to their real nature could be obtained. The only possibility suggested by their appearance was that they were encysted amœbæ in which division of the cell contents had taken place. They were examined with the greater interest as they suggested the cysts described by Professor Hallier as the special choleraic form of fructification of his cholera series of fungi. They did not, however, agree with his descriptions of such cysts, being of much smaller size, without the faintest indication of septation, and neither then nor subsequently did they show any evidences of being fungal in their nature.

Occurrence of fungal spores rare and seemingly accidental.

181. As regards the occurrence of fungal spores in choleraic evacuations, I can only repeat what was previously remarked, *i. e.*, that although such bodies may occasionally be present in small numbers, just as algoid and other kinds of vegetable cells occasionally are, yet their occurrence is comparatively very rare. In as far as my observations have gone, the individual cells are neither abundant nor of any special form, but are usually recognisable as belonging to dematieous and sphæriaceous genera, in which the thick-walled spores are likely to undergo transit through the intestinal canal with little detriment.

Cysts.

Starch cells may be mistaken for fungal cysts.

182. It would be quite unnecessary here to enter into any lengthy discussion regarding the nature of the cystoid bodies occurring in choleraic, diarrhœal, and normal evacuations, seeing that the question has been fully treated of by Dr. Lewis, and I would merely add that, in addition to the various classes of bodies which he has enumerated as likely to be mistaken for special cysts, there appears to me to be another class which might readily, during the course of a cursory examination, be included under the term of cysts, and of cysts agreeing in some degree with Professor Hallier's descriptions of the specific cholera cysts. I allude to certain forms of starch cells, for such cells which have escaped destruction in the intestinal canal, but which have been more or less completely emptied by the solution of their contents, frequently appear in the evacuations as delicate cysts presenting appearances suggestive of internal septation, but due, in most instances at least, not to the presence of actual septa, but to slight foldings or creases of the cell wall upon itself. Among the commonest of such cells occurring in the evacuations of cholera as developed in the Native population of Calcutta are *dhál* cells (Plate II, fig. 4 A. F). Figure A shows such cells, empty and full, from cholera evacuations, and figure F similar cells as obtained direct from washed sections of *dhál* grains.

No special development of fungi in choleraic or cholerized media.

Professor Hallier's choleraic series has not appeared.

183. Not only are distinct fungal elements very rare in recent choleraic evacuations in Calcutta, but there is no special tendency to the development of such bodies in such materials, even when subjected to prolonged exposure to the air. As regards choleraic materials unmixed with any extraneous substances this is very distinctly the case, for although, during the course of observation, such materials were constantly exposed to the air beneath bell-glasses for weeks at a time, yet in very few instances did any distinct development of yeast cells or of other fungal elements take place. A persistent layer of bacterial matter remained on the surface, which in a few instances ultimately showed the presence of a few scattered yeast cells or short mycelial filaments among its constituents; but in not a single instance did the rapid and abundant development of such bodies, characterising certain diarrhœal evacuations, take place. The results of extended series of observations on the cultivation of choleraic materials in various media and under various circumstances of exposure to, or exclusion from, external influences have likewise afforded not the faintest support to the idea that there is any special form of fungus associated with such materials. It is not merely the case that there has been a failure in the appearance of Professor Hallier's cholera series of forms, but a failure in the appearance of any special forms whatsoever. In none of the cultivations which came under my own observation did any species of *Mucor* ever occur, while *Penicillium* forms only appeared comparatively rarely. That species of *Mucor* should fail to appear is not to be wondered at, seeing that the genus does not appear to be of prevalent occurrence in Calcutta, or at all events has not been prevalent since the observations on cultivation of choleraic materials have been

Widely diffused and generally prevalent forms appear on cholerized as in other media.

in progress. One species of *Ascophora* does, no doubt, occasionally occur, but with nothing like the constancy and seeming indifference as to medium with which certain forms of *Aspergillus* do, and it is precisely these widely diffused and generally prevalent forms which are usually developed in cultivations of choleraic materials.

Characters of the commonest species.

184. The two commonest forms occurring as the result of cultivations are shown, Plate X, fig. 3, A.; Plate VII, fig. 1, A., fig. 2, A. B. The first (Plates X, fig. 3, A; VII, fig. 2, A), and by far the commonest, of these is perfectly ubiquitous, appearing on all sorts of decomposing substances and at all times of year. It consists of a delicate, colorless, closely-jointed mycelium giving origin to numerous erect, jointless, fertile filaments. The summit of the filament forms a rounded capitellum covered with a dense coating of fusiform spicules (*vide* Plate VII, fig. 2, A), bearing necklaces of spores and frequently proliferating. These spores are globular, at first colorless, becoming of a beautiful vivid canary-yellow, and finally assuming a more or less ochrey or buff tint. The mycelial threads occasionally bear large spore-like bodies directly without the intervention of any special threads (Plate VII, fig. 5). These are formed by the gradual accumulation of protoplasmic matter in lateral or terminal dilatations. As the accumulation advances the body becomes circular, assumes a yellow color, and is finally separated by the closing in of its investing membrane, which is continuous with that of the filament giving origin to it. These spores, when separated, consist of a delicate but tolerably resistent cell wall containing a mass of seemingly homogeneous yellow protoplasm. When subjected to cultivation they give rise to numerous radiating branched filaments bearing short, erect fertile threads terminating in chains of circular spores (Plate VII, fig. 6). The curious point in reference to these threads was that they appeared, in some instances at least, to be rather penicillioid than aspergilloid in their characters, as they did not terminate in a distinct capitellum, but were divided into two or three separate spore-bearing processes.

Formation of large spore-like masses on the mycelium.

Occasional occurrence of *Eurotium*.

185. A species of *Eurotium* (*Eurotium herbariorum?*) was on one occasion observed in association with this form of *Aspergillus*, and seemingly arising from the same mycelium as it did (Plate XI, fig. 4, A, B, C). The soil on which the mycelium was developed was not however a choleraic one, but consisted of decaying bamboo and damp paper. The perithecia (A) were of a brilliant yellow color and beautifully reticulated (B); the asci (C) small and containing 3 or 4 spores. The same form of *Eurotium* without any accompanying aspergillus was subsequently found on decaying vegetable matters at Ootacamund, and a similar form, only differing in being perfectly colorless, on dried plants in Calcutta.

Characters of another common species.

186. The second species of *Aspergillus** of common occurrence on choleraic materials, as well as on other decomposing substances, is very much more striking in size and structure than the previous one. It is by no means of so constant occurrence as the common yellow form, but occasionally almost entirely replaces it. The mycelium is composed of very delicate branched filaments bearing a great number of dilatations or macroconidia of Professor Hallier (Plate VII, fig. 1 A). From this delicate mycelium large erect fertile filaments arise which attain a considerable length, and appear entirely out of proportion to the threads giving origin to them. These filaments bear at their apices very large heads of a rich deep-brown color composed of multitudes of minute circular spores. The structure of the head is complex and of great beauty (Plate VII, fig. 2, B). The fertile threads, which are erect and jointless, swell at their summits into more or less globular capitella. These are covered externally by a series of wedge-shaped processes, the bases of which are peripheral, and bear three or four small secondary processes or spicules from which the chains of minute brown spores arise. This very characteristic form appears to be widely diffused throughout the peninsula, as unmistakable heads of it were found in specimens of water at Trichinopoly.

Structure of the heads.

Other common species.

187. Of much less frequent occurrence than the above forms are two others which are very distinct from them and from each other. The first is a small glaucous green form (Plate VIII, fig. 5 A; Plate VII, fig. 3 A)—apparently *Aspergillus glaucus*. It occasionally occurs in cultivations of choleraic materials as well as in other media, and is seemingly very indifferent as to the nature of its soil. The second is very uncommon, and appears to merit more particular description (Plate VII, fig. 1, B, fig. 3, B). The fertile filaments are very long, slender, and decumbent, usually found trailing among and over the stems and heads of the common yellow form. They are terminated by small heads of a beautiful neutral tint composed of spores aggregated on a

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* It is very doubtful whether this form can be included under the genus *Aspergillus*, as the structure of the head is so peculiar.

I only retain it here on account of ignorance as to what it should properly be referred to, and because in outward appearance it closely resembles an *Aspergillus*.

simple capitellum, and here and there throughout their course they give rise to short, lateral branches bearing similar heads.

Penicillium much less frequent than *Aspergillus*.

188. *Penicillium* forms appeared neither so frequently nor so abundantly during the course of cultivations, as the commoner forms of *Aspergillus* did. When present, the spores showed various shades of greenish grey, fawn or white, but in no instance was any form peculiar to choleraic materials discovered. Plate VII, figure 4, shows penicillium heads and dilatations as developed in choleraic material, Plate XI, figure 2, *Penicillium glaucum* occurring on decaying vegetable matters in Calcutta, and Plate XI, figure 6, the *Penicillium* commonly occurring in the Neilgherries. The dilatations above referred to are those on which Professor Hallier lays so much stress as affording an evidence of the tendency of *Penicillium* to pass into *Mucor*. In addition to dilatations, the mycelial threads occasionally gave direct origin to elongated chains of spores or conidia.

General results of observations and experiments on fungi.

The forms of fungi appearing on choleraic media in Calcutta only resemble those appearing at Jena in belonging to the species commonest on other media.

189. The general results of all the observations and experiments which I have been able to make up to the present time may be shortly stated as follows:—*1st*, distinct fungal elements are not common in or characteristic of fresh choleraic evacuations; *2nd*, there is no special tendency to the subsequent development of such elements or their results in choleraic, as compared with other decomposing materials; *3rd*, there is no special form of fungus peculiar to choleraic materials; *4th*, the forms of fungi which appear as the result of the cultivation of choleraic materials, with or without the addition of other media, are merely those which are commonest on other decomposing organic substances at the same season and under similar circumstances; *5th*, the members of Professor Hallier's Cholera series of forms do not in Calcutta show so great a tendency to appear as those of other series do; *Mucor* generally failing to appear at all, and even *Penicillium* being comparatively rare and quite subordinate to *Aspergillus*. Were it merely the case that the special forms described by Professor Hallier generally failed to appear, it might yet be argued that such a failure was of little importance as an argument against a fungal origin of cholera, seeing that some authorities incline to the belief that "it is scarcely possible to doubt that the various forms of fungi which are characteristic of particular situations are not really distinct species, but that the same germ will develop into different forms, according to the soil on which it falls,*" so that the forms occurring in Calcutta may be supposed to arise from germs identical in nature with the German ones, but giving rise to different developments, due to the influence of different external agencies. When, however, we take this failure along with the fact that in Calcutta, as in Jena, the forms developed belong to so-called species of common occurrence on other decomposing substances, the evidence against the existence of any special germ appears to be tolerably strong.†

Advantages of vagueness of heading.

190. V. Oval and Circular Cells.—I shall now consider a number of bodies which may be classed under the one general head of "oval and circular cells." Any heading of this kind is, no doubt, most objectionable on account of its vagueness; but seeing that the precise nature of many of the bodies included under it remains as yet unascertained, and that in many instances we have nothing to guide us in the discrimination of various kinds of cells, which although similar in appearance are yet very different in nature, there is at all events a certain amount of practical utility in the use of terms of considerable vagueness, seeing that to go farther in the endeavour after exactness of definition would in reality be to go beyond positive knowledge.

Oval and circular cells constant and abundant in choleraic dejecta.

Debris arising from their disintegration indistinguishable from that due to disintegrated epithelial cells.

191. The results of all the examinations of choleraic materials which I have had the opportunity of making in this country leave me no room to doubt that oval and circular cells of various sizes and varying degrees of distinct definition and dimness, of clearness and molecularity, and of high or low refractive power, free, in masses, or embedded in a gelatinous or molecular basis, do really constitute the bulk of the white flocculent deposit of most choleraic evacuations. Such cells begin to appear in the earliest evacuations, and, as a general rule, go on steadily increasing in numbers until the supervention of reaction or death. When, as is the case in the majority of freshly-passed evacuations, they are present in a well-defined and undisintegrated condition, there is no possibility of mistaking them for epithelium, unless it be assumed that cells utterly deficient in epithelial characters, and endowed at the same time with very distinctive features of their own, have necessarily arisen from transformations in epithelial cells. If, on the other hand, the material has passed on into the process of disintegration, which usually supervenes with great rapidity, the molecular debris arising from the destruction of these cells is of course indistinguishable, by appearance at all events, from that resulting from the disintegration of epithelium.

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* Quoted in *The Genesis of Species* from *Habit and Intelligence*.

† For observations on the occurrence of fungi on rice, and on the forms of microscopic fungi chiefly prevalent in Calcutta, &c., *vide* Note B, appended.

192. Such cells occurred in 87 of the tabulated cases, and in the majority of these in such abundance as to form by far the most characteristic feature in the materials composing the sediment. They vary considerably in size and other minor points in various instances, and I shall now proceed to give an abstract of a few cases illustrative of these variations.

Cases illustrative of the appearance and characters of oval and circular cells clearly distinct from intestinal epithelium occurring in the evacuations of cholera.

Illustrative case.

Absence of epithelium and red blood-corpuscles.

Characters of the cells present.

Case 1, No. 87, of the table (Plate IV., Fig. 3).—The patient was a Frenchman who was admitted into the General Hospital on the morning of the 21st May 1870. He was in collapse and was said to have been attacked at 2 A. M. The evacuation No. 87 was one of several examined at different times during the course of the case. It was passed at 7-45 A. M., and examined five minutes later. It consisted of an abundant, almost colorless, intensely alkaline fluid of a specific gravity of 1,005, and of a considerable amount of sediment, composed of large, loose, gelatinous, white flocculi, which rapidly and completely subsided to the bottom. On microscopic examination not a trace of recognisable epithelium or of red blood-corpuscles could be detected anywhere. The fluid was at first almost entirely free from *Bacterium*, &c. No yeast cells or other fungal elements were visible. In the lower portion of the fluid there was an abundance of free circular cells of various sizes. (Plate IV., Fig. 3.) They were colorless, highly refractive, and variously shaded with fine molecular matter. In superficial focus they appeared as bright circular bodies with a shaded outline; as the focus was deepened they showed themselves to be finely molecular, frequently marked by one or two distinct granules, and presenting a great general resemblance to the white corpuscles of the blood, mucus corpuscles, &c., *i. e.*, they appeared to be masses of bioplasm of various sizes. Some of them were already beginning to show signs of disintegration, but the majority were clear and well defined.

Mother cells containing several distinct masses within them.

There were also a few nearly circular specimens of cercomonads, faintly moving by means of their flagella. The flocculi consisted of a gelatinous, finely molecular basis, studded with granules, and everywhere crowded with circular cells similar to those in the fluid. (Plate IV., fig. 3.) They showed various degrees of distinctness and dimness, but as long as they were visible as cells at all, could not be mistaken for epithelium. In some cases there was a manifest separation of the cell contents from the cell wall, and in others the cells could be seen to contain a varying number of small bodies in their interior, quite distinct from the granules previously mentioned, and appearing to be differentiated masses of "bioplastic" matter, similar in appearance to those seen in exudation cells after treatment with acetic acid. (Plate III, Fig. 6 B, cells from the serum of a blister treated with dilute acetic acid.) Disintegration proceeded rapidly during the course of the examination, and at the close of three hours, flocculi which were at first crowded with distinct cells like those of the figure, had become mere molecular flakes, showing only here and there faint outlines of circular bodies and small patches of granules.

Illustrative case.

Characters of the cells present.

Absence of epithelium and of red blood-corpuscles.

Rapidity of disintegration.

Case 2, No. 58, of the table (Plate III., Fig. 5).—The patient was admitted into the General Hospital in profound collapse, and died a few hours subsequently. The evacuation entered in the table was passed about 6 hours before death, and was examined immediately. It consisted of transparent, almost colorless watery fluid, and a scanty sediment of pale brownish-grey gelatinous flocculi. The flocculi subsided at once, and were of such a gelatinous consistence that portions for examination could only be obtained by the use of scissors and forceps. The reaction of the fluid was intensely alkaline, and the smell faint and mawkish. *Results of microscopic examinations*:—The fluid was quite clear and contained hardly a trace of *Bacterium*. Specimens from the lower part of the material showed an abundance of free, oval and circular cells of various sizes, all of them beautifully and clearly defined, refractive, and in many cases containing several smaller bodies in their interior. Some were softly molecular, and marked by granules and clear vacuoles, while others showed a hard, sharply-defined outline, with more or less separation of the contents from the cell wall. Some were accurately circular, others oval, and a few somewhat irregular in outline. (Plate III, Fig. 5.) Movement of granules, changes in the distribution of the contents causing alterations in vacuolation, and even changes of form could be observed in many of the cells. The flocculi consisted of a structureless gelatinous material in which myriads of cells like those of the fluid were embedded, with a scanty sprinkling of free granules. There was no evidence of the presence of epithelium or of red blood-corpuscles. The cells in the flakes in many instances showed changes similar to those observed in the free cells of the fluid, and here and there they were in short series, suggestive of macroconidial chains. One specimen was kept under observation for an hour and a half, and the rapidity of the process of disintegration which took place in this period was very remarkable. Brightly refractive, well-defined cells were seen to pass into mere flakes of molecular matter containing one or two prominent granules, but quite amorphous and without a trace of any limiting membrane. In other cases the outlines of the cells remained marked out as granular circles, giving the flake a more or less distinctly honeycombed aspect. At the close of the observation only a few cells retained their distinctness, those which did do so being invariably those characterised at first by hardness of outline and distinct separation of contents from the cell wall, and the flocculi had become evenly molecular and granular in structure, only here and there showing a few dim circular masses or patches of honeycombed texture. This rapid disintegration was not peculiar to this specimen, but occurred generally throughout the evacuation as evidenced by numerous preparations derived from it at intervals.

Illustrative case.

Characters of the cells present.

Rapid disintegration.

Case 3, No. 38, of the table.—The patient was a prisoner in the Alipore Jail. Before admission into hospital he had been purged four times. No. 38 was the first evacuation passed after admission. It consisted of about two-thirds of a pale-grey, watery fluid, and one-third of sediment composed of small, whitish flocculi, rapidly and completely subsiding to the bottom of the vessel. The reaction of the fluid was alkaline and the smell mawkish. The fluid contained a mere trace of bacterial matter, but in the lower part showed abundance of beautifully clear circular cells, red blood-corpuscles, and oval and circular cercomonads of both varieties in great numbers. The circular cells were of very various sizes, some being very small, others of the size of average white blood-corpuscles, and others very large and containing several distinct cellules, or differentiated masses in their interior (Plate III, fig. 6, A). In one or two instances they were seen to contain red blood-corpuscles in their interior. The flocculi consisted of a finely molecular, gelatinous material in small quantity, in which masses of oval and circular cells similar to those of the fluid, together with numerous active cercomonads, were embedded. The circular cells showed most distinct content-changes and slight bioplastic movements and alterations of form. Disintegration proceeded rapidly, so that at the close of a few hours comparatively few cells retained their distinctness, while next day only a sprinkling of shrunken half-broken up cells and of slowly moving cercomonads, with a large amount of molecular debris, was visible. One or two bodies, which might be imperfect epithelial cells, were also seen during the first examinations.

Illustrative case.

Character of the cells present.

Absence of epithelium and red blood-corpuscles.

CASE IV, No. 63, OF THE TABLE.—The patient was a Negro, who was admitted into the General Hospital suffering from a slight attack of cholera. The evacuation was examined within an hour after it had been passed. It consisted of a dirty brownish fluid, with an abundant powdery sediment containing numerous fragments of undigested food. The reaction of the fluid was alkaline, and the smell offensive, but not characteristic. The fluid contained a good deal of active vibrionic and bacterial matter. There was everywhere abundance of remains of undigested animal and vegetable tissues and much of the debris of normal evacuations. All throughout fluid and flocculi were abundant circular cells, the majority of large size, and many showing cellules in their interior.—(Plate II, fig. 1, A.) A few large amœboid cells, changing form or slowly crawling from place to place, and one cercomonad were also observed. Not a trace of epithelium, red blood-corpuscles, or evident fungal elements to be seen. Disintegration was proceeding rapidly both in the circular cells and the *Amœbæ*, so that at the close of two hours hardly any specimens of either remained distinctly visible, mere granular and molecular rings and heaps being all that was left to indicate their former presence.

Illustrative case.

Some red blood-corpuscles present.
Characters of the cells present.

Absence of epithelium.

CASE 5, NO. 67, OF THE TABLE.—The patient was a prisoner in the Alipore Jail, and was attacked by cholera while in hospital on account of some trivial ailment. No. 67 was the first evacuation which was passed during the progress of the disease. It consisted of a watery, greenish fluid, and a powdery sediment forming about one-sixth of the bulk of the whole material. The reaction was alkaline, the smell faint and mawkish. On microscopic examination the sediment was found to contain large quantities of debris of undigested vegetable tissues, *dhál* cells, starch granules, spiral fibres, &c. There was throughout much gelatinous granular matter, myriads of active cercomonads of the second variety, and circular cells of various sizes in great abundance, with red blood-corpuscles and some large freely moving *Amœbæ*. The circular cells varied considerably in appearance, some appearing of firm consistence with high refraction, and more or less distinctly marked with a double outline; others were soft, molecular and shaded, closely resembling white blood-corpuscles, as usually seen after their vital movements have ceased; others were emitting delicate protrusions from one or more points of their circumference, while others again were almost structureless, or with more or less shrunken contents and delicate distended cell walls. The red corpuscles showed various alterations in form, some being fusiform, others drawn out to a point at one side, and others concavo-convex or quite irregular. In the fluid between the flakes there was a sprinkling of *Bacterium* and of moving granules. Not a trace of epithelium was to be seen, and no cells which even bore a resemblance to intestinal epithelium. The successive evacuations passed subsequently during the course of the case were examined with the following results.

Characters of successive dejecta.

2nd Evacuation.—This only differed from the 1st in containing less undigested debris, and in the flocculi of the sediment being of considerably increased size. Not a trace of epithelium in a recognisable form was detected.

3rd Evacuation.—This was precisely similar to the 2nd in physical and microscopical characters.

Presence of mother cells.

4th Evacuation.—This consisted of a watery, pale grey fluid, slightly tinged with brown, and of an abundant but only slowly subsident sediment of fine white flocculi. The reaction was alkaline and the smell mawkish. The fluid contained an abundance of bacterial matter almost entirely in a state of rest. There were also great numbers of active cercomonads of various sizes, and of still molecular circular cells of various degrees of definition and of various sizes. The flocculi were composed of similar cells imbedded in the normal molecular basis. Some of the circular cells showed three or four distinct bodies included within them, as frequently observed on previous occasions. No red blood-corpuscles or epithelium were visible: some of the cercomonads when they ceased moving presented a superficial resemblance to imperfect epithelial cylinders.

5th Evacuation.—This only differed from the previous one in its sediment being small in amount and rapidly subsident.

6th.—Similar in its characters to the previous, but containing a much smaller number of cercomonads.

7th.—This only differed from the preceding ones in containing a few red blood-corpuscles, and in the fact that some of the circular cells, in place of soft molecular shadings, presented the hard refractive aspect of those alluded to as occurring in the first evacuation.

Illustrative case.

Characters of the cells present.

Absence of epithelium.

CASE 6, No. 50, OF THE TABLE.—The patient was a prisoner in the Alipore Jail, and was admitted into hospital on the 6th March 1870. Previous to admission he had been purged four times, and No. 50 was the first evacuation passed after admission. It consisted of about two-thirds of pale-grey watery fluid, and one-third dirty-grey powdery sediment, containing numerous distinct fragments of undigested food. The reaction was alkaline and the smell faint and characteristic. The fluid contained much bacterial and vibrionic matter, the greater part of which was at rest. Many free, energetically moving granules and flakes of fine molecular matter, mingled with abundant debris of undigested vegetable tissues, were also present. The flocculi were composed of the usual gelatinous basis crowded with circular cells. Throughout both flocculi and fluid were great numbers of active cercomonads. The circular cells, which were beautifully and clearly defined, contained numerous granules, which in some cases showed distinct movement within the cells; and where the latter were free in the fluid, could be seen occasionally to escape and move off by themselves. Their movement, whether mechanical or not, was very energetic and determined. Disintegration, as usual, proceeded rapidly. Not a trace of epithelium was to be detected.

Characters of subsequent dejecta.

6th Evacuation.—This consisted of three-fourths of a watery grey fluid, and one-fourth of sediment composed of large gelatinous white flocculi, containing a few small fragments of undigested food. The reaction of the fluid was highly alkaline. The fluid contained a mere trace of *Bacterium*, but quantities of active cercomonads of small size and of circular cells in various degrees of distinctness and disintegration. The flocculi consisted of a gelatinous basis, in some places appearing almost structureless, in others molecular and containing numerous bacterial particles. Throughout this basis were multitudes of oval and circular cells of small size, and numerous distinct cercomonads. No recognisable epithelium was to be seen.

7th Evacuation.—This differed in nothing from the previous one, save that the flocculi were smaller and that there was a considerably greater amount of *Bacterium*.

8th Evacuation.—This consisted of about six-sevenths of watery grey fluid, and of one-seventh of powdery, rapidly subsident flocculi. The gelatinous element was only present in small proportion, the reaction was strongly alkaline, and the smell faint, mawkish, and sickening. In microscopic characters this evacuation differed little from the previous ones. It was chiefly characterised by the very great numbers of active cercomonads present in both fluid and flocculi. Circular cells were also very abundant, but no epithelium could be found.

Characters of the last evacuation of the case.

Last evacuation of the case.—Passed by the patient when moribund. This consisted of a small quantity of dark-red fluid with a very copious dark-red flocculent sediment. The reaction was alkaline and the smell offensive. Microscopic examination showed much fine bacterial and vibrionic matter, and enormous quantities of red blood-corpuscles and active cercomonads, together with a few still circular cells. In several instances blood-corpuscles were seen to be included within or attached to the surface of energetic cercomonads.

Characters of the fluid contained in the intestines.

The patient died at 1 P. M. of the 7th March, and at 2 P. M. the *post-mortem* examination was performed. While the intestines remained *in situ*, a portion of the lower part of the ileum was included between a couple of ligatures and reserved for microscopic examination. A small opening was subsequently made in this separated portion, and the contents as they escaped received into a clean gallipot. They consisted of a thick fluid of a red color, and closely resembled the last evacuation, save that the color was hardly so dark as in it. Microscopic examination also gave almost the same results, the only differences being that in this case there were fewer red blood-corpuscles, and a small number of cylindrical epithelial cells.

Illustrative case.

Characters of the cells present.

CASE VII, No. 17, OF THE TABLE.—No. 17 was the last evacuation passed by a patient, who died in the Alipore Jail Hospital in August 1869. It consisted of a dirty pinkish fluid, with a very abundant sediment of large pale-grey flocculi. The fluid contained numerous *Bacteria* and large *Vibriones* with a few active cercomonads. The flocculi consisted of gelatinous basis, crowded with beautifully defined oval and circular cells. When first examined they were very distinct, of high refractive power, showing clearly defined vacuoles and content changes, and in some instances even slight changes in form.—(Plate III, fig. 1.)

Characters of intestinal contents.

The contents of the ileum of the same case were also examined. The material of this did not differ sensibly in external appearances from No. 17, but on microscopic examination showed an abundance of distinct epithelial cells as well as a few red blood-corpuscles.—(Plate III, fig. 2.)

Illustrative case.

CASE VIII, No. 53, OF THE TABLE.—The patient was a prisoner in the Alipore Jail, and was admitted into hospital on the 7th March 1870, suffering from a slight attack of cholera. No. 53 was the 6th evacuation passed during the progress of the case. It consisted of three-fourths of dirty brownish-grey fluid, and of one-fourth of brownish-grey sediment composed of minute flocculi. The flocculi were rapidly and completely subsident, the reaction strongly alkaline, and the smell offensive.

Characters of the cells present.

The fluid contained a considerable amount of bacterial and vibrionic matter. The flocculi consisted of amorphous granular matter, with quantities of fragments of undigested vegetable tissues and other debris like that characteristic of normal evacuations. Everywhere throughout the fluid, as well as in the flakes, were scattered cells of various appearances. 1st, the most abundant were small, circular, intensely refractive, and frequently showing a double outline more or less distinctly. They were colorless or of a faint greenish hue, Plate II, fig. 3, B. globular, and either solitary or in couples, forming figures of 8. 2nd, the next in frequency were active cercomonads. 3rd, all throughout there was a sprinkling of molecular cells, some showing bioplastic movements, while others crawled freely from place to place. There was also a certain number of molecular circular cells of similar size to the amœboid ones, but showing a hard double outline and no manifest movement or change of any kind.

Assertions that there is no evidence of a development of new cells in cholera.

Existence of strong evidence in favor of the presence of new cells.

193. The above cases may serve to indicate the prominent features which certain cellular bodies constitute in the dejecta of many cases of cholera in Calcutta. It would be easy to multiply the number of such cases, but it appears to be unnecessary to occupy farther space in what would virtually be mere repetition. As many as eight cases would not have been given in detail, had it not been that certain authors have insisted that there is no process of cell development associated with cholera. This is a statement the universal truth of which I would venture most decidedly to call in question, seeing that, in as far as my observations have gone, the majority of perfectly fresh choleraic evacuations appear to furnish very distinct evidences of new cell-growth.

Much of the material of the flocculi may be due to disintegration of previously existing elements.

194. That much of the material composing the flocculi may be due to the washing out of disintegrated mucus, epithelium, and gland cells from the lining of the intestinal canal is very probable, and certainly cannot be denied as a possibility; but that the whole of it is due to such a process alone I cannot believe, seeing that, even if it be granted that the epithelium is almost invariably so much disintegrated as not to be recognisable, it makes the appearance of cells resembling gland and mucus cells, in a definite and recognisable form, only the more incomprehensible, as the disintegration of them might be equally expected.

The flocculi are not mere masses of amorphous debris.

195. Were no cells whatsoever present, and were the flocculi mere masses of amorphous debris and epithelium, the case would be very different; but unless such is actually proved to be the case, it is not very easy to see on what grounds any opinion that there is no new cell-growth associated with cholera can be founded. That there is necessarily a new cell-growth, as an essential part of the cholera process, is quite another question, and one which it is not necessary to consider here.

Rapid disintegration does not prove no previous new formation.

196. It may however be allowed that cells are present in abundance in the evacuations; but it may at the same time be urged that even the cases quoted themselves go far to prove that there is no new cell-growth, seeing that some cells are noted as being in a state of disintegration when first examined, and all, even those at first most clearly defined, as rapidly passing into such a state; but it does not follow that cells because disintegrating are not due to recent formation, and the very rapidity of disintegration, observed to take place in the cells outside the body, is rather in favor of the rapidity of their development within it. When disintegrating pus cells are found in urine, it is not denied

that they have arisen by a process of "new cell-growth;" and the rapidity of the disintegration of the oval and circular cells of the flocculi, as observed to take place outside the body, is not greater than that which frequently affects the active cercomonads and *Amœbæ* associated with them, and which can scarcely be said to be originally disintegrated, although they very rapidly become so.

The dejecta in almost all cases are full of cells.

197. The cases given in detail afford examples of the appearances presented by almost all the choleraic dejecta which I have had an opportunity of examining. In almost all cases they were characterised by the presence of a profusion of cells, or bioplastic masses of round or oval form, some exhibiting vital movements, others entirely at rest or showing mere content-change; some softly molecular and shaded, others hard, refractive, and showing a more or less distinct double outline; some clear, delicate, almost structureless, others with shrunken contents, cupped or flattened margins, and delicate protrusions; some solitary, others in masses, series, figures of 8, &c.

What is the nature of these cells?

198. Now if there be this profusion of cells, and if at the same time it appears to be impossible to ascribe their presence to the mere washing out of the normal mucus, epithelium, and "gland cells" of the intestinal canal in a disintegrated condition, to what are they to be ascribed, and what is their real nature? Unfortunately this is a question to which only a very imperfect answer can be given.

Various kinds are present.

Some may be remains of mucus, &c.

Others white blood-cells.

199. In the first place, there can be no doubt that in almost every case the cells present are of several kinds—kinds no doubt closely resembling one another in appearance, but at the same time frequently very different in nature, and that the relative proportions of the different kinds vary greatly in different instances. It is very probable that some of the cells, or rather remains of cells, do belong to the disintegrated mucus and epithelium alluded to by various authors. Others of them, as Dr. Lewis has clearly pointed out, may undoubtedly be assumed to be white blood-corpuscles, more especially in those cases in which there is distinct evidence of the presence of red corpuscles. Still it must be borne in mind, 1*st*, that it will not do, because a cell resembles a white blood-cell in size, general appearance, and character of movement, to conclude that it necessarily is a white blood-cell, seeing that there is almost nothing to distinguish white blood-corpuscles from other portions of amœboid living matter, save that their natural habitat is the blood plasma;* and, 2*nd*, that cells giving the normal reaction of white blood-cells with acetic acid are, as far as I have been able to ascertain, of rare occurrence in choleraic dejecta, while occurring in abundance in those of dysenteric cases (Plate II, fig. 3, C, D), even when the latter are as fluid and devoid of color as many of the former.

Many of them infusorial.

Many of the cells, and among these most of those forming series like the macroconidial chains of Professor Hallier, are, I believe, to be ascribed to processes of division and multiplication, as well as to the resting conditions of those amœboid and monadiform infusoria which undoubtedly appear to find a congenial medium in the alkaline choleraic fluid (*vide* experiments on normal and diarrhœal dejecta).

A great proportion of undetermined nature.

Possibilities regarding the origin of these cells.

200. Besides all such gland and mucus cells, white blood-corpuscles and infusoria, there remains a great mass of cells to be accounted for—cells which are apparently in a rapid state of division and multiplication, frequently showing more or less manifest bioplastic movement, and sometimes containing several smaller bodies included within them.—(Plate II, fig. 1, A; Plate III, fig. 6, A.) What these cells really are, and how they are produced, remains a matter of uncertainty; but there appear to be various possibilities regarding them; 1*st*, they may be due to a process of development of "wandered" white corpuscles and bioplastic elements of the blood; 2*nd*, they may be due to rapid development of cells from the bioplasms of the mucus, gland and epithelial cells—a development favored by the excessive transudation of fluid from the blood; 3*rd*, it is possible that they may be due to the development of foreign bodies of the nature of Dr. Beale's contagion bioplasms. Such appear to be some of the possibilities regarding the origin and nature of these cells; but however they are accounted for, or fail to be accounted for, they are at all events present, and certainly any so-called explanation accounting for them, by the convenient assumption that they are merely disintegrated mucus, epithelium, &c., is worse than no explanation at all, seeing that it is totally inconsistent with the facts in many cases.

Whatever their origin may be, they are present.

Complication regarding their nature.

201. The whole question would be greatly simplified were not the choleraic fluid, as previously mentioned, such a favorable medium for the development of infusorial bodies within the intestinal canal.

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* "In fact, except that it is dependent for the conditions of its existence upon the plasma, it might be compared to one of those simple organisms which are met with in stagnant water, and are called amœbæ."—HUXLEY.

As it is, in Calcutta at all events, it appears almost hopeless to endeavour to lay down a definite line of demarcation between the cells which are to be regarded as intrinsic to, and those which are to be considered as extrinsic to, the disease; such a line at least as would give any security that no cells belonging to the one class should ever be included with those of the other; and certain cases, such as some of those previously quoted, in which undoubted infusorial elements almost entirely replace other forms of cells, almost suggest the possibility that this great development of cells may be a mere accident dependent on the nature of the transuding fluid, and not an essential part of the disease process at all.

Large amount of debris in the earlier evacuations of many cases.

Crystals.

Ova of entozoa.

Algæ.

Oil globules.

Acari.

202. VI. MISCELLANEOUS MICROSCOPIC BODIES OCCASIONALLY OCCURRING IN CHOLERAIC DEJECTA.—Having now briefly enumerated what appear to be the more constant and characteristic microscopic features of choleraic dejecta as occurring in Calcutta, it only remains to mention a few of the structures which occasionally and accidentally are to be met with in them. As previously mentioned, there is naturally in the earlier dejecta of many cases a large amount of debris of undigested food, remains of animal and vegetable tissues, muscular fibres, starch cells and granules, spiral fibres, &c.—(Plate II, fig. 4, A, C). In some cases crystals of ammonio-phosphate of magnesia are present, sometimes in such abundance as to form a very prominent feature.—(Plate II, fig. 6, A.) Crystals of a different nature, previously alluded to as possibly some form of blood crystal, are also sometimes to be detected.—(Plate II, fig. 6, B.) They are of much more frequent occurrence than those of the ammonio-phosphate, but never occur in the same abundance as the latter occasionally do. Ova of various forms of entozoa are also of frequent occurrence, especially in native cases (Plate II, fig. 5, A, B), as well as minute free worms in various stages of development. Other cases show distinct evidence of the use of impure drinking water, in the form of desmids, *Pediastra*, and other algoid cells embedded in the gelatinous basis of the flocculi.—(Plate II, fig. 5, C, D.) Oil globules are occasionally present, usually in the earlier dejecta, and seldom in any great abundance. As a general rule, however, they do not appear to be of common occurrence, and many bodies which closely simulate them appear to me to be referable to a class of cells resulting from processes of division in the commonly occurring infusoria, and specially in the *Antœbæ*, processes which will be described in connection with observations on non-choleraic dejecta. There are also occasionally specimens of an *Acarus*, seemingly the *Acarus farinæ*, and its ova, in various stages of disintegration,—an occurrence which cannot be wondered at, considering the abundance of this animal, which is frequently to be found in flour in Calcutta.

General results of observations on choleraic dejecta.

203. As a summary of the general conclusions to which my observations have led me, it may be shortly stated that, *1st*, epithelium in a recognisable form occurs only in a very small percentage of cases; *2nd*, red blood-corpuscles, although occurring more frequently than recognisable epithelium, are absent in very many cases; *3rd*, the choleraic fluids form a favorable medium for the development of certain forms of *Amœbæ* and *Monads*, but these bodies are not peculiar to such fluids. I have as yet, however, failed to find *Monads*, identical with those of the evacuations, in "the drains," &c., of Calcutta; and as the addition of water almost invariably causes the destruction of those present in the evacuations, it appears doubtful whether they do exist in the supposed profusion in those localities; *4th*, there is no necessary special abundance of *Vibriones* or *Bacteria* in fresh choleraic dejecta, no excessive development of such bodies during the decomposition of these dejecta, and no evidence as yet of the presence of any peculiar form in them; *5th*, the occurrence of distinct fungal elements is exceptional and accidental; *6th*, there appears, as a general rule, to be distinct evidence of the development of a large number of new cells or bioplastic masses within the intestinal canal, but, as we shall presently find, these bodies are not confined to cholera cases, although their abundant presence is a constant and remarkable feature of such dejecta.

Table facilitating the comparison of choleraic and non-choleraic dejecta.

204. Having now described the characteristic features of choleraic dejecta, it appears to be desirable that they should be compared with those of the dejecta of healthy and other non-choleraic conditions, in order to ascertain how far, and in what respects, the two differ. With a view to facilitate such comparison, I have compiled the accompanying table exhibiting the characters of 100 non-choleraic dejecta, by means of which the various proportions of certain classes of bodies occurring in them may be compared with a certain degree of accuracy with the proportions of similar bodies occurring in choleraic materials. The majority of the specimens were derived either from persons in whom there was no intestinal affection, or from cases of simple diarrhœa, 2 were from slight cases of dysentery, and 6 from cases of diarrhœa induced by the use of purgatives. The first 66 specimens were obtained in Calcutta; the remaining 34 in the south of India. This table does not exactly correspond with the former one, as the columns for red blood-corpuscles and epithelium are omitted on account of the extreme infrequency of the occurrence of either. When they did occur, the fact is noted in the last column.

Table of Principal Microscopic Characters of Diarrhœal and other Non-Choleraic Evacuations.

No.	Reaction.	Physical Characters.	MICROSCOPICAL CHARACTERS.				Remaining Characters, &c.
			Infusoria.		Fungi Cells.	Oval and Circular Still Cells.	
			Monads and Amœbæ.	Vibriones and Bacterium.			
1	Not noted	Large amount of fluid and scanty yellowish sediment.	None ...	Very abundant...	None ...	One or two ...	This case was one of simple diarrhœa.
2	" ...	Greenish-yellow, watery fluid, with frothy scum and scanty sediment.	One or two	Very abundant and active.	Very abundant.	A mere trace ...	Ditto; smell sour and yeasty. Full of fragments of undigested vegetable tissues.
3	" ...	Two-thirds greyish fluid, one-third flocculent sediment.	None ...	Very abundant...	None ...	" ...	Simple diarrhœa.
4	" ...	Sediment containing much obvious undigested debris.	A few ...	Not noted ...	Very abundant.	None ...	Ditto.
5	" ...	Dirty, brown fluid and scanty sediment.	Abundant...	Abundant ...	None ...	" ...	Produced by sulphate of magnesia.
6	" ...	Three-fourths pale greenish-yellow fluid; sediment white flocculent.	Abundant of both forms.	Very abundant and of large size.	Abundant ...	Abundant ...	Ditto; the still oval and circular cells were in masses and marked with double outline.
7	" ...	Equal parts dirty-brown fluid and large gelatinous grey flocculi; 4th stool passed in case.	None ...	Very abundant, large and active.	" ...	Very few ...	Simple diarrhœa. The circular cells indistinct and dim; oil globules abundant.
8	" ...	Fluid whitish, watery, flocculi scanty, large, yellowish, and tending to float.	" ...	Not noted ...	Not noted...	One ...	Ditto. Full of fragments of vegetable tissues.
9	Acid ...	Dirty greenish watery fluid; sediment scanty, abundant frothy scum; 3rd stool in case.	" ...	Abundant, active	Very abundant.	A few ...	Ditto. Yeasty smell, abundant undigested tissues, and many oil globules.
10	" ...	Thick bright-yellow fluid, with much evident oily matter above, and many fragments of undigested food.	" ...	Very abundant and active.	Abundant...	None ...	Ditto. Oil globules abundant.
11	Faintly acid	Pinkish-brown muddy slime	" ...	None ...	None ...	Abundant ...	These cells gave with acetic acid the normal reaction of white blood-cells. A scanty sprinkling of red blood-corpuscles was also present.
12	At first alkaline, becoming shortly afterwards acid.	Greenish-yellow watery fluid, full of large, very gelatinous flocculi.	Two ...	Very abundant and active.	Very abundant.	None ...	Simple diarrhœa; smell yeasty; tendency to froth; contained much starch.
13	Acid, becoming neutral.	Dirty greenish-yellow, watery fluid and large gelatinous flocculi; 8th in case, sp. gr. 1010.	A few large Amœbæ.	Very abundant and active.	A few ...	" ...	Produced by sulphate of magnesia.
14	Neutral, becoming alkaline.	Watery greenish fluid and yellowish gelatinous flocculi.	One or two	Scanty ...	None ...	" ...	Ditto ditto. Flakes structureless, molecular, and like the basis of cholera flakes.
15	Alkaline, becoming neutral.	Pale brownish watery fluid, and abundant pale brownish flocculi.	Very abundant.	A sprinkling ...	" ...	A sprinkling ...	Produced by sulphate of magnesia. The most of the circular cells were molecular and some emitted protrusions.
16	Faintly alkaline, becoming strongly acid.	Watery brown fluid, and scanty powdery sediment.	None ...	Abundant ...	" ...	A few ..	Produced by sulphate of magnesia. A sprinkling of crystals (phosphatic ?) present.
17	Very acid ...	Whitish, opalescent, watery fluid; sediment very scanty.	" ...	A few ...	Abundant...	None ...	Simple diarrhœa.
18	Alkaline ...	Fluid watery, pale yellowish, sp. gr. 1006; sediment bluish-white, very gelatinous.	A few ...	Very abundant...	None ...	" ...	Ditto. Full of epithelium.
19	Neutral ...	Watery pinkish fluid, with scanty sediment and large amount of pasty scum.	None ...	" ...	A few sarcinous masses.	Abundant ...	The cells very granular. Ascaris ova abundant. Simple diarrhœa.
20	Not noted...	Pale-grey watery fluid, with abundant sediment of gelatinous grey flocculi.	" ...	" ...	Minute sarcinous flakes.	A sprinkling ...	The latter cells with delicate outline and shrunken contents. Simple diarrhœa.
21	Neutral, becoming faintly alkaline.	Brown watery fluid, with slight sediment of yellowish powdery matter and small flocculi.	A few, some of these amœbæ.	Abundant ...	None ...	Abundant ...	The latter cells gave with acetic acid the normal reaction of white blood-corpuscles. The case was one of dysentery with profuse watery stools. A few red blood-corpuscles also present.

Table of Principal Microscopic Characters of Diarrhœal and other Non-Choleraic Evacuations,—continued.

No.	Reaction.	Physical Characters.	MICROSCOPICAL CHARACTERS.				Remaining Characters, &c.
			Infusoria.		Fungal Cells.	Oval and Circular Still Cells.	
			Monads and Amœbæ.	Vibriones and Bacterium.			
22	Acid ...	Dirty pale-yellow fluid with yellow oily layer on the surface, and full of undigested food.	None ...	Abundant ...	None ...	None ...	Produced by castor oil in same case as No. 15. Oil globules very abundant.
23	Not noted...	Pink, yellowish-brown fluid	A few ...	Abundant and active.	„ ...	Abundant ...	Simple diarrhœa.
24	Very faintly acid.	Brownish fluid ...	One or two	Very abundant and active.	„ ...	One or two ...	Ditto.
25	Faintly alkaline.	Semi-fluid ...	Abundant, active. A few large encysted *Amœbæ*.	Abundant ...	„ ...	A sprinkling ...	Contained the usual debris common in healthy evacuations.
26	Neutral ...	Formed ...	None ...	A sprinkling ...	„ ...	A few ...	Ditto ditto.
27	„ ...	„ ...	„ ...	„ ...	„ ...	„ ...	Ditto ditto.
28	Faintly acid	„ ...	„ ...	„ ...	„ ...	One or two ...	Ditto ditto.
29	Faintly alkaline.	„ ...	A few ...	„ ...	„ ...	A few ...	Ditto ditto.
30	Neutral ...	„ ...	One or two	„ ...	„ ...	None ...	Ditto ditto.
31	Faintly acid	„ ...	None ...	„ ...	„ ...	One or two ...	Ditto ditto.
32	Neutral ...	„ ...	„ ...	„ ...	„ ...	A few ...	Ditto ditto.
33	Faintly acid	„ ...	„ ...	„ ...	„ ...	A mere trace ...	Ditto ditto.
34	„ ...	„ ...	„ ...	„ ...	„ ...	A sprinkling ...	Ditto ditto.
35	Acid ...	„ ...	One ...	„ ...	„ ...	„ ...	Ditto ditto.
36	„ ...	„ ...	None ...	„ ...	„ ...	„ ...	Ditto ditto.
37	Faintly acid	„ ...	One ...	„ ...	„ ...	„ ...	Ditto ditto.
38	Neutral ...	Unformed ...	A sprinkling	„ ...	„ ...	„ ...	Ditto ditto.
39	„ ...	Formed ...	None ...	„ ...	„ ...	„ ...	Ditto ditto.
40	Acid, becoming neutral.	„ ...	A few. *Amœbæ* at first still, afterwards beginning to crawl.	„ ...	„ ...	One or two ...	Ditto ditto.
41	Faintly acid	„ ...	None ...	„ ...	„ ...	A few ...	The few cells present very dim. Debris as usual.
42	„ ...	„ ...	„ ...	„ ...	„ ...	A mere trace ...	Ditto ditto.
43	Neutral ...	„ ...	„ ...	„ ...	„ ...	A very few ...	Ditto ditto.
44	Acid ...	„ ...	„ ...	„ ...	„ ...	„ ...	Ditto ditto.
45	„ ...	„ ...	„ ...	„ ...	„ ...	Only 2 cells visible.	These cells with double outline. Debris as usual.
46	„ ...	„ ...	„ ...	„ ...	„ ...	A few ...	Contains the usual debris.
47	„ ...	„ ...	„ ...	„ ...	„ ...	„ ...	Ditto ditto.
48	„ ...	„ ...	„ ...	„ ...	„ ...	„ ...	Ditto ditto.
49	Not noted...	„ ...	One ...	„ ...	„ ...	„ ...	Ditto ditto.
50	Acid ...	„ ...	None ...	„ ...	„ ...	„ ...	Ditto ditto.
51	„ ...	Semi-fluid ...	One or two	„ ...	„ ...	„ ...	Ditto ditto.
52	Alkaline ...	Fluid ...	A few ...	„ ...	„ ...	„ ...	Ditto ditto.
53	Faintly acid	Semi-fluid ...	One seen ...	„ ...	„ ...	A mere trace ...	Ditto ditto.
54	„ ...	Formed ...	None ...	„ ...	„ ...	„ ...	Ditto ditto.
55	„ ...	„ ...	„ ...	„ ...	„ ...	A few ...	The few cells present very dim. Debris as usual.
56	Very faintly acid, alkaline on drying.	Fluid ...	Numerous...	Abundant ...	„ ...	Abundant ...	Ditto ditto.
57	Acid ...	„ ...	None ...	A sprinkling ...	„ ...	A few ...	Ditto ditto.
58	„ ...	„ ...	„ ...	„ ...	„ ...	„ ...	Ditto ditto.
59	Neutral ...	Semi-fluid ...	Numerous...	Very abundant...	„ ...	Numerous ...	Ditto ditto.
60	Acid ...	Formed ...	None ...	A sprinkling ...	„ ...	A few ...	Ditto ditto.
61	„ ...	Semi-fluid ...	Two seen ...	„ ...	„ ...	A trace ...	Ditto ditto.
62	„ ...	Formed ...	None ...	„ ...	„ ...	„ ...	Ditto ditto.
63	„ ...	„ ...	„ ...	„ ...	„ ...	„ ...	Ditto ditto.
64	„ ...	Semi-fluid ...	A few ...	Very abundant and active.	„ ...	A few ...	Ditto ditto.
65	„ ...	Formed ...	One or two	A sprinkling ...	„ ...	None ...	Ditto ditto.
66	„ ...	„ ...	None ...	„ ...	„ ...	A few ...	Ditto ditto.
67	„ ...	Semi-fluid ...	„ ...	„ ...	„ ...	„ ...	Ditto ditto.
68	„ ...	„ ...	„ ...	„ ...	„ ...	One or two ...	Ditto ditto.
69	„ ...	„ ...	„ ...	„ ...	„ ...	None ...	Ditto ditto.
70	„ ...	Formed ...	„ ...	„ ...	„ ...	„ ...	Ditto ditto.
71	„ ...	Fluid ...	„ ...	Very abundant and active.	„ ...	„ ...	Ditto ditto.
72	„ ...	Formed ...	„ ...	A sprinkling ...	„ ...	„ ...	Ditto ditto.
73	„ ...	Semi-fluid ...	„ ...	„ ...	„ ...	One or two ...	Ditto ditto.
74	„ ...	Formed ...	„ ...	„ ...	„ ...	„ ...	Ditto ditto.
75	„ ...	Fluid ...	„ ...	„ ...	„ ...	None ...	Ditto ditto.

Table of Principal Microscopic Characters of Diarrhœal and other Non-Choleraic Evacuations,—concluded.

No.	Reaction.	Physical Characters.	MICROSCOPICAL CHARACTERS.				Remaining Characters, &c.
			Infusoria.		Fungal Cells.	Oval and Circular Still Cells.	
			Monads and Amœbæ.	Vibriones and Bacterium.			
76	Acid	Semi-fluid	None	A sprinkling	None	A few	The few cells present very dim. Debris as usual.
77	„	Formed	„	„	„	One or two	Ditto ditto.
78	„	„	„	„	„	A few	Ditto ditto.
79	„	Fluid	„	„	„	„	Ditto ditto.
80	„	Formed	„	„	„	A very few	Ditto ditto.
81	„	Semi-fluid	„	„	„	None	Simple diarrhœa. Ditto.
82	„	„	„	„	„	One or two	The few cells present had a distinct double outline. Debris as usual.
83	„	Fluid	„	„	„	None	Simple diarrhœa. Ditto.
84	„	Formed	„	„	„	„	Ditto ditto.
85	Neutral	Semi-fluid	„	Very abundant and active.	„	One or two	Ditto ditto.
86	Acid	Formed	„	A sprinkling	„	None	Ditto ditto.
87	„	„	„	Very abundant and active.	„	„	Ditto ditto.
88	„	„	„	„	„	„	Ditto ditto.
89	Alkaline	„	„	A sprinkling	„	„	Ditto ditto.
90	Acid	Fluid	„	Very abundant and active.	„	„	Ditto ditto.
91	Alkaline	Semi-fluid	„	A sprinkling	„	A few	Ditto ditto.
92	Acid	Fluid	„	Very abundant and active.	„	None	Ditto ditto.
93	Neutral	„	„	„	„	„	Ditto ditto.
94	„	Semi-fluid	„	A sprinkling	„	„	Ditto ditto.
95	Acid	Formed	„	„	„	„	Ditto ditto.
96	„	„	„	„	„	A few	Ditto ditto.
97	Neutral	„	„	Very abundant and active.	„	None	Ditto ditto.
98	„	Semi-fluid	„	„	„	„	Ditto ditto.
99	Acid	Formed	„	„	„	„	Ditto ditto.
100	„	Fluid	„	Very abundant and active.	„	„	Ditto ditto.

205. I.—REACTION OF NON-CHOLERAIC DEJECTA.—The reaction of the material in the 100 cases tabulated was as follows:—

	REACTION OF DEJECTA.	No.
Reaction.	Acid	62
	„ becoming neutral on drying	2
	„ „ alkaline on drying	1
	Neutral	13
	„ becoming alkaline on drying	2
	Alkaline	6
	„ becoming neutral on drying	1
	„ „ acid on drying	2
	Not noted	11
	TOTAL	100

The degrees of the acidity in the prevailing reaction varied extremely, being in some cases so slight as to be hardly perceptible, and in others very strongly marked.

206. II.—PHYSICAL CHARACTERS.—The physical characters were naturally very different according to the nature of the case from which the material was derived, ranging from those of normal healthy dejecta to those of a watery fluid with hardly a trace of sediment. The most important point to be noted, as we shall subsequently find in the details of cases of diarrhœa induced by large doses of sulphate of magnesia, is that simple artificially induced diarrhœa may cause the evacuations to assume general characters, precisely similar to those of cholera without inducing a single characteristic choleraic symptom. Such dejecta frequently occur with a colorless or pale-grey fluid, and a sediment composed of white or pale yellowish, gelatinous flocculi, rapidly and completely subsident, and are absolutely indistinguishable in outward appearance, at least from those which are characteristic of cholera. To such a degree is this the case, that on several occasions I have known medical men with a large

The dejecta of diarrhœa may assume the characters of those of cholera.

experience of cholera cases unhesitatingly pronounce such material choleraic, and only with difficulty convinced that this was really not its nature.

207. III.—Microscopical characters: 1, Infusoria; A, Monads and Amœbæ.—On reference to the table it will be seen that monads or *Amœbæ*, or both, were present in 28 of the cases tabulated. These 28 cases all occurred in Calcutta. The fact that none were found in the materials examined in the south of India may, no doubt, be in part due to the want of those means and appliances facilitating thorough examination in Calcutta, but at the same time these bodies certainly appear to be less common as an accompaniment of diarrhœa there than in the latter place. In Calcutta they occurred in 42·42 per cent. of the cases examined. In 6 cases they were present in abundance, in the remaining 22 in small numbers, those detected ranging from one to a scanty sprinkling.

Reaction of infusorial dejecta.

208. The reaction of the materials in which they occurred, together with a general statement regarding the numbers detected in each instance, is shown in the following table:—

Reaction.		Number of infusoria.
1. Acid		One or two.
		One.
	3	One.
	4	One or two.
	5	One.
	6	Two.
	7	A sprinkling.
	8	One or two.
2. Acid, becoming neutral on drying	1	A sprinkling.
	2	A sprinkling.
3. Acid, becoming alkaline on drying	1	Abundant.
4. Neutral	1	One or two.
	2	A sprinkling.
	3	Abundant.
5. Neutral, becoming alkaline on drying ...	1	One or two.
	2	A sprinkling.
6. Alkaline	1	A sprinkling.
	2	Abundant.
	3	A sprinkling.
	4	A sprinkling.
7. Alkaline, becoming neutral on drying ...	1	Very abundant.
8. Alkaline, becoming acid on drying	1	Two.
9. Not noted	1	One or two.
	2	A sprinkling.
	3	Abundant.
	4	Abundant.
	5	A sprinkling.
	6	One.
Total	28	

Apparent connection of alkalinity of medium and development of infusoria.

Of the 22 specimens in which the reaction was noted, there were 9 either acid or tending to become so on drying, and 13 neutral, alkaline, or tending to become so. Of the 9 belonging to the former class, only 1 showed more than one or two specimens of monads or *Amœbæ*, while of the 13 of the latter class, 11 showed more than one or two, and 4 showed an abundance. These cases are too few to found definite conclusions on, still they appear to indicate the existence of a connection between an alkaline condition of the evacuations and the development of certain infusoria in them, and we shall hereafter see, in considering those cases in which fungal cells formed a prominent characteristic, that the latter cells seldom co-exist with the former, but rather appear to take their place in acid media. This substitution of fungal for infusorial cells may be due either to the medium originally being of an acid nature, or to some other cause favoring the development of the former class of bodies, and resulting in the induction of acidity dependent on that development. In the first case the infusoria must be supposed never to be largely developed, that is, if it be true that acidity of the medium is unfavorable for them; while in the second case they may or may not be largely developed at first, but if largely developed, are subsequently worsted in the "struggle for existence."

Half the cases in which infusoria were abundant, the result of saline purgatives.

209. Six of the 28 cases were the result of large doses of sulphate of magnesia, and in 3 of these the infusorial cells were abundant, *i. e.*, in one-half of all the specimens in which they were present in large numbers, the medium was the result of a saline purgative.

Cases in which the dejecta contained monads, &c.

210. The following notes regarding certain of the cases in which infusoria appeared are here subjoined in order to facilitate the comparison of them with similar choleraic cases previously given.

Case I, No. 14, of the Table.—The patient from whom the materials of No. 14 of the table were derived requiring active purgation was treated freely with sulphate of magnesia with the following results:—At 6 A. M. oz. 1. of the salt was administered. Between the hours of 6 and 9 A. M. the patient passed two watery evacuations, weighing together lbs. 6. At 9 A. M. he weighed lbs. 120. Between 9 and 10 A. M. he was twice purged. At 10 A. M. he took drs. 4 more of the salt. At 1 P. M. he weighed lbs. 118. Between 1 and 4 P. M. he was again twice purged; at the latter hour he weighed lbs. 117 oz. 4. The patient while under this treatment was for a time rather faint, but had no choleraic symptoms.

Illustrative case.

Loss of weight of lbs., 2 oz. 12 in 7 hours.

No. 14 of the table was the 5th evacuation in the case. It consisted of a dark-greenish watery fluid, and a sediment of large, greenish-yellow gelatinous flocculi. The reaction was neutral or very faintly acid, becoming faintly alkaline on drying. The fluid contained a sprinkling of minute *Bacteria* and one or two small active *cercomonads*.

The flocculi were composed of a molecular, structureless, gelatinous material similar to that forming the basis of the choleraic flocculi.

6th Evacuation of the same case.—This consisted of a watery, pale-yellowish fluid, with a scanty sediment of rapidly and completely subsident flocculi of considerable size and whitish colour. The reaction of the fluid was neutral, becoming strongly alkaline as the paper dried. The fluid contained a sprinkling of *Bacteria* and numerous active *cercomonads* and *Amœbæ*, the majority of the latter of small size, some lying at rest, others emitting protrusions, and others crawling freely from field to field.—(Plate VI, fig. 6.) The flocculi consisted of the usual molecular gelatinous basis in which were numerous *Amœbæ*, and circular cells like those of the choleraic flocculi. In some places so many of the latter cells were present as to furnish appearances exactly similar to those of the common choleraic materials.

Flocculi similar to those of choleraic dejecta.

They showed all the varieties of aspect as to shading, outline, &c., previously described in regard to the cells in choleraic materials, and here also it was seen to be impossible to distinguish cells which subsequently proved themselves capable of free progression, from those either not observed to move at all, or merely altering form and emitting protrusions. In one or two places were specimens of the "macroconidial chains" occurring in choleraic media, and probably due, as before mentioned, to processes of division in the *Amœbæ*.—(Plate VI, fig. 6, A.)

Case II, No. 15, of the Table.—This case was that of a man to whom it had been found necessary to administer a continued course of purgatives. The evacuation No. 15 was one which was passed at the close of a period of three days, in each of which he had taken oz. 1 of sulphate of magnesia three times a day. At the time at which it was passed he had been frequently purged, and as he was not looking well, was breathing rapidly, and complained of pains in his lower extremities, the administration of the drug was stopped and opium and acid given in its place. The evacuation consisted of a pale brownish, watery fluid, and an abundant sediment of pale brownish flocculi.

Illustrative case.

Symptoms present when the material No. 15 was passed.

The reaction of the fluid was, when first applied to the paper, faintly alkaline, and became neutral on drying. The fluid contained a scanty sprinkling of active *Bacteria*. The flocculi were composed of gelatinous molecular matter, with numerous particles of undigested food, and large numbers of crystals of various sizes of the ammonio-phosphate of magnesia. Throughout both fluid and flocculi were swarms of active *cercomonads* of the second variety. (*Vide* page 188).

Abundant crystals.

There were also considerable numbers of circular cells like those of choleraic evacuations. Some of these were intensely refractive and with hard, sharply defined outlines; others were molecular, softly shaded, and contained several granules; some were free, others embedded in the molecular matter of the flocculi: some still and others emitting delicate protrusions. The patient had evidently been drinking water containing organic impurities, as several fresh *desmids* and other algoid cells were embedded in the substance of the flocculi. The fluid appeared rapidly to undergo some change, rendering it an unfavorable medium for the *cercomonads*, as the latter speedily lost their activity and distinctness, so that at the close of 40 minutes from the commencement of the observation few remained in activity, and those were feeble in movement and dim in outline. At the close of 75 minutes not an active cell was to be seen, many had totally disintegrated and disappeared, and the fluid contained nothing but dim circular and oval cells, with irregular molecular patches and delicate rings.

Medium unfavorable to the continued activity of the infusoria.

The patient continued to complain of uneasiness, burning pain in the epigastrium and pains in the limbs, but after the administration of a dose of opium and acid passed no more evacuations until the morning of the next day. The materials composing the dejecta at that time were precisely similar to those of the previous day. There was the same fluid, flocculi, and active and still cells. The number of *cercomonads* present was very great, 100 to 120 active specimens being present in some fields. The administration of opium and acid was continued, and on the following day all purging had ceased and the patient was apparently quite well, having lost the pains in the epigastrium and limbs as well as the peculiar respiration.

Extreme abundance of active *cercomonads*.

Obstinate constipation now recurred, and after the lapse of several days castor-oil was administered, it appearing to be unadvisable to give salines on account of the disagreeable symptoms coinciding with their use previously. The administration of the oil was followed by purging, but the evacuations were of a totally different nature from those induced by the sulphate of magnesia. They consisted of a dirty, pale-brownish yellow fluid, with a yellow oily layer on the surface, and contained numbers of floating and suspended particles of various sizes. The reaction was acid. The microscope showed the presence of abundant active *Bacteria*, with quantities of the undigested debris of food and oil globules of various sizes, but failed to show any *cercomonads*, circular cells or crystals like those of the former materials.

Dejecta produced by castor-oil totally different from those resulting from sulphate of magnesia in the same patient.

Case III, No. 25, of the Table.—The evacuation No. 25 was one which occurred during the course of a slight attack of simple diarrhœa. Beyond the diarrhœa and the presence of slight griping pains, the patient complained of nothing. The material was composed of a thick brownish, semi-fluid mass, giving an alkaline reaction. When examined microscopically with the addition of a little water, it showed the usual debris and *Bacteria* common in normal evacuations, a plentiful sprinkling of dim circular and oval cells, and one or two larger encysted bodies similar to those figured.—(Plate VI, fig. 1, A.) When a little freshly boiled and filtered alkaline fluid from a cholera evacuation was substituted for the water in the first specimen, similar cells were again seen in abundance, but very much brighter and more distinctly defined. Some of them were circular, some oval; some were of the common molecular and granular character, others sharply defined and showing a distinct double outline. Some of the cells, both oval and circular, moved freely through the fluid by means of delicate flagella, and one or two of the larger, encysted cells emitted protrusions or moved in an amœboid fashion from place to place.—(Plate VI, fig. 1, B.)

Illustrative case.

CASE IV, No. 38, OF THE TABLE.—This material was derived from a slight case of simple diarrhœa. It consisted of a mass of soft, brown, semi-fluid feculent matter of a neutral reaction. It contained the usual debris, &c., characteristic of normal dejecta. A scanty sprinkling of oval and circular cells and a few large *Amœbæ* were present.—(Plate VI, fig. 1.) Few of any form were active at first, but after they had been for a short time in contact with the alkaline fluid of a choleraic evacuation treated as in case III, many of them became very active, the oval and circular cells swimming freely about, and the *Amœbæ* losing their double outline, emitting protrusions, and crawling from place to place. When the medium was rendered acid, all movement ceased, and the cells became motionless and dim.

Illustrative case.

Effect of alkaline fluid in inducing activity in infusorial cells.

CASE V, No. 40, OF THE TABLE.—This material was derived from a slight case of simple diarrhœa. The evacuation consisted of a thick brown fluid. The reaction was, when first applied, faintly acid, and became neutral as the paper dried. Examination of the material alone and mixed with choleraic fluid gave similar results. In both cases the normal debris, &c., of healthy evacuations was abundant. There was a very scanty sprinkling of oval and circular *cercomonads*. In the majority of fields none could be detected, in a certain number there were one or two, and in one at the lower part of one preparation as many as 8 active cells were observed. There were also a few encysted and moving *Amœbæ* present.—(Plate VI, fig. 1.)

Illustrative case.

211. The above cases may serve to indicate that the dejecta of cases of diarrhœa may present almost every microscopic feature characterizing those of cholera. They show at all events that flocculi with a gelatinous basis and containing distinct infusorial and amœboid cells are not peculiar to cholera.

Almost every microscopic feature of choleraic dejecta may characterize those of diarrhœa.

212. While, however, the presence of these infusoria is not confined to choleraic dejecta, a comparison of the two tables appears to indicate that such bodies are both of more frequent occurrence and of greater abundance in such dejecta than in those of health or of diarrhœa. The probability that an alkaline medium has a considerable influence in promoting their multiplication and development has been already suggested, and the facts noted in case No. 4 appear to support this hypothesis; for in this material the addition of alkaline choleraic fluid caused increased activity in the infusoria which were present, while acid entirely arrested all movement when added to the same fluid. That mere fluidity of the medium is not the essential element in securing their presence appears to be demonstrated by the latter fact, as well as by the effects induced by the addition of water, which does not induce activity in those bodies which are still, and which on the contrary, as a general rule, stills and frequently destroys those previously active. The same thing is indicated by those numerous cases of diarrhœa in which there is a copious discharge of watery fluid with hardly any or no co-existent infusoria. The consideration of this point, as well as of others in regard to the occurrence of copious discharge of fluid from the intestines independent of any other choleraic symptom, may be most conveniently deferred until the remaining facts in connection with the tabulated cases have been considered.

Mere fluidity of the medium not sufficient to secure the development of infusoria.

213. B. VIBRIONES AND BACTERIA.—With regard to the occurrence of these bodies, little need be added to what was previously mentioned regarding their occurrence in choleraic media. As a general rule, in non-choleraic dejecta, distinct *Vibriones* and *Bacteria* are present in a proportion increasing with the fluidity of the medium. Their number, as well as their activity, appears to be quite independent of the reaction of the medium, as they are to be found indifferently in cases where it is strongly acid as well as when it is decidedly alkaline. Although they appear to increase in proportion to increased fluidity, both *Bacteria* and true active *Vibriones* are frequently present in the most normal dejecta. As compared with choleraic materials, the dejecta of diarrhœa appear to be more frequently characterised by an excessive development of *Bacteria*, *Vibriones*, and the "*Leptothrix* chains" of Professor Hallier, and the results of the cultivation of non-choleraic materials containing such elements have been the development of all the forms of fungi characterising corresponding choleraic cultivations; so that in the first place there is evidence against any lesser proportion of such elements being present, and in the second place against the non-existence of any particular kind.

Numbers and activity of *Bacteria* and *Vibriones* independent of reaction of the medium.

214. 2. FUNGI.—In 11 cases of diarrhœa examined in Calcutta, the dejecta contained fungal cells, and in 8 of these cases they were present in abundance, forming a characteristic feature in the evacuations, both when fresh and during the progress of decomposition outside the body. In 7 of the cases the diarrhœa was of spontaneous origin; in one only, No. 6 of the table, it was the result of sulphate of magnesia, and in none of them were there any symptoms of cholera. The patients were all natives, and the dejecta were characterised by the presence of a large excess of undigested vegetable tissues in the sediment, and by the copiousness and watery nature of the fluid portions. The following are the notes recorded regarding certain of these cases:—

Cases of diarrhœa in which fungal cells formed a prominent feature.

CASE I, No. 12, OF THE TABLE.—The patient was a prisoner in the Alipore Jail, suffering from an attack of simple diarrhœa, without the slightest symptoms of a choleraic nature. The material consisted of a dirty yellowish watery fluid, full of large, very gelatinous yellowish flocculi, which were long in subsiding and ultimately separated into two nearly equal portions, one of which formed a

Illustrative case.

No choleraic symptoms.

loose sediment, while the other floated to the surface. The reaction at first was alkaline, and in the course of a few hours became acid. The smell was faint and yeasty, and there was a gradual disengagement of gas, which tended to form a layer of froth on the surface. The fluid was full of active *Bacteria* and "*micrococcus* colonies," small *Vibriones*, and large "*leptothrix chains*." In four specimens which were examined only two *monads* could be found, both of which were of the peculiar spathulate form previously described. No other cells resembling those which are so abundant in choleraic evacuations were to be seen. All throughout the fluid small circular cells of hard sharp outline and bright refraction were abundant. They were either solitary, or in pairs and small masses, the latter generally composed of four closely aggregated cells.—(Plate VIII, fig. 1, A.) Viewed in deep focus each cell appeared to include a small granule. Acetic acid produced no effect upon them, and iodine caused them to become of a vandyke-brown, passing into brown-madder. The flocculi were composed of a gelatinous molecular basis, full of vegetable tissues,—spiral fibres, epidermal cells, hairs, empty or partially empty starch cells, and an abundance of starch grains and molecules. Everywhere there was a profusion of cells similar to those of the fluid. They were embedded in the gelatinous basis of the flocculi, either scattered or aggregated into huge irregular masses.—(Plate VIII, fig. 1, B.) The evacuation was set aside beneath a bell-glass and examined at intervals. On the following day the reaction of the fluid was intensely acid. Energetic *Vibriones* were present in increased numbers, but the material appeared otherwise unchanged, save that the greater number of the flocculi had now subsided to the bottom. On the next day numerous distinct white fungal patches were present on the surface of the fluid, which was of a strongly yeasty odour. The white patches were found to be composed of masses of cells like those originally present, mingled with an abundance of distinct yeast cells. The cells were frequently associated in pairs, yeast cells apparently taking origin from the circular cells (Plate VIII, fig. 2), while various degrees of transitional forms intermediate between the two types were also present. The sediment showed the original masses of cells from which, in some instances, delicate oval cells could be seen projecting and seemingly budding out.

Effect of re-agents on the cells.

Appearances presented on the following day.

CASE II, No. 17, OF THE TABLE.—The patient was a prisoner in the Alipore Jail. The evacuation consisted of a whitish, opalescent, watery fluid, and a little sediment composed of minute white flocculi. The reaction of the fluid was strongly acid, and its specific gravity 1006. The fluid was full of short *leptothrix* filaments, and contained numerous yeast cells, solitary or in branched masses. The flocculi consisted of the usual gelatinous, molecular mucous basis with a few embedded yeast cells.

Illustrative case.

Strong acidity of the fluid.

CASE III, No. 9, OF THE TABLE.—The patient was a prisoner in the Alipore Jail. The evacuation consisted of a dirty greenish watery fluid, with scanty sediment of gelatinous flocculi, an abundant frothy scum, acid reaction and yeasty odour. The fluid contained an abundance of *Bacteria*, and the flocculi were composed of the usual gelatinous basis in which an abundance of undigested vegetable tissues were embedded together with masses of fungoid cellules, full sized yeast cells, and numerous oil-globules. This evacuation was the third passed in the progress of the case, and the three subsequent to it retained the same characters. On the following day they were covered by continuous, dense, surface layers of a white color, which here and there showed distinctly mouldy patches. These patches were found to consist of dense thickets of brilliant, colorless, erect jointed filaments, arising from a felt of the same material. Examined under a higher power, these were found to present the characters of *Oidium Lactis*, consisting of scantily jointed filaments branched and bearing strings of greater or less extent of long oval cells.—(Plate VIII, fig. 3.)

Illustrative case.

Abundance of undigested vegetable tissues.

Development of *Oidium*.

CASE IV, No. 10, OF THE TABLE.—The patient was a native prisoner in the Presidency Jail. He was admitted into Hospital suffering from vomiting and diarrhœa, but showed no choleraic symptoms. The evacuation was composed of a thick, bright, yellow liquid which could be seen, even by the naked eye, to be crowded with oil-globules towards the surface. It contained abundant fragments of undigested food, and showed no tendency to separate into distinct layers of fluid and sediment. The reaction was decidedly and permanently acid, and the fluid left an oily stain on the paper. The fluid was full of extremely energetic *Bacteria*, portions of undigested vegetable tissues, and oil-globules of various sizes. Mingled with these were masses of fungoid cellules and distinct yeast cells.

Illustrative case.

Abundant oil-globules.

CASE V, No. 7, OF THE TABLE.—The patient was a prisoner in the Alipore Jail. The evacuation, the 4th in the case, consisted of about equal parts of dirty brownish watery fluid, and large, loose gelatinous greyish-yellow flocculi. Fully half of the latter floated on the surface, and the remainder continued suspended in the fluid, showing no tendency to form a distinct sediment. The smell was offensive and putrefactive, but had none of the characteristics of that of normal choleraic dejecta. The fluid was everywhere full of large active *Bacteria* and *Vibriones*. The flakes were also crowded with similar bodies mingled with fragments of vegetable tissue, oil-globules, and fungoid cellules. One or two small flocculi were found, which resembled those of cholera in some degree, in which there were a certain number of indistinct circular cells. On the following day about one-third of the flocculi floated on the surface, the smell was yeasty, and the reaction strongly acid. Microscopic examination showed numerous distinct yeast cells, and forms intermediate between these and the cellules of the previous day, which were also present in large quantities.

Illustrative case.

Abundant undigested vegetable tissues.

CASE VI, No. 13, OF THE TABLE.—The patient was a native suffering from obstinate constipation and symptoms of mania. He was treated with large doses of sulphate of magnesia. These caused very free purging. He never had the slightest choleraic symptoms, but on one occasion fainted, apparently due to the large amount of fluid which was very rapidly drained off in the evacuations. The treatment had the desired effect of curing both the constipation and the mania, and afforded excellent opportunities for the observation of the materials of evacuations caused by the action of saline purgatives.

Illustrative case.

Fainting without any choleraic symptoms.

No. 13 was the evacuation caused by the treatment. It consisted of a dirty greyish-yellow watery fluid, with an abundant sediment of large gelatinous flocculi, and a certain amount of similar material floating on the surface. Fragments of undigested food, rice grains, &c., were mingled with the flocculi. The reaction of the fluid was decidedly acid, becoming neutral on drying; its specific gravity was 1010; it had a tendency to frothing and its smell was offensive. The fluid was full of *Bacteria* and large active and still *Vibriones*. In numerous specimens which were examined, not more than 5 or 6 *monads* were detected, taking all the specimens together. The flocculi consisted mainly of undigested vegetable tissues embedded in a molecular gelatinous basis, similar to that of the flocculi of choleraic dejecta. A few large *Amœbæ* were crawling from place to place, and here and there were large masses of *Zooglœa*. Both in fluid and flocculi there were a few yeast cells, solitary or in masses.

A few yeast cells present in the 8th evacuation.

The 9th, 10th, and 11th dejecta were subsequently examined. They closely resembled one another in characters, so that one description will serve for all of them. All three closely resembled choleraic dejecta in appearance. They consisted of a greenish-grey watery fluid with an abundant sediment of large gelatinous white flocculi. These were at first entirely subsident, but shortly afterwards some of them showed a tendency to float upwards. The reaction was very faintly alkaline, becoming neutral. The fluid contained a sprinkling of slender *Bacteria* and *Vibriones*. The flakes consisted of the usual gelatinous molecular basis, in many places covered with brownish granules, and in others full of the filaments of *Leptothrix* and an abundance of yeast cells, scattered or in irregular masses (Plate VIII, fig. 4). In other places they contained numerous small indistinct oval cells, quite unlike the sharply defined brightly refractive cells found in choleraic flocculi. The granular matter of the flakes was not due to starch, and was colored bright yellow on the addition of iodine. These evacuations subsequently became intensely acid, and were after a few days covered by dense white layers of yeast cells.

Yeast cells abundant in the 9th, 10th, and 11th.

Results of cultivation of such dejecta.

215. Cultivation of the fungal patches, which appeared on the surface of these and similar cases, usually resulted in the development of abundant heads of the common yellow *Aspergillus*, with occasionally a few heads of *Penicillium*. That fungal cells should occasionally form a prominent feature in the evacuations of the diarrhœa of natives is not to be wondered at, as the great masses of vegetable tissues which constitute the ordinary native diet must, unless digested, afford an excellent nidus for the development of fungal elements swallowed along with them, or in drinking water. That the fungi have any effect in originally inducing the diarrhœa is very improbable, but that when in large quantities, and undergoing rapid development, they may produce a certain amount of irritation and so tend to keep it up is quite possible.

Facilities provided for the development of fungi by the native dietary.

Abundant discharge of watery fluid from the intestines without the induction of choleraic symptoms.

216. Before proceeding to the consideration of the remaining points in connection with non-choleraic dejecta, it may be remarked that certain of these cases of diarrhœa were characterised by a very profuse and rapid discharge of watery fluid from the intestinal canal, and were yet entirely free of the slightest symptoms of cholera. So profuse was this discharge in Nos. 13 and 14 of the table as to cause syncope in the former, and a tendency towards it in the latter case. In the latter, as previously mentioned, the patient's weight was diminished by lbs. 2 oz. 12 in the course of 7 hours, due to the discharge of a watery fluid and of flocculi similar to those of cholera; and yet with the exception of a tendency to syncope, there was no symptom of cholera present. This loss of weight cannot be ascribed to mere emptying of the intestinal canal, as it occurred after the passage of lbs. 6 of fluid dejecta.

Assumed non-absorption in cholera.

217. The fact that such profuse and rapid discharge of fluid from the intestinal mucous membrane can occur without producing any of the special symptoms of cholera is of some importance in connection with statements which are frequently advanced ascribing such symptoms to the profuse discharge. Cases like the above rather tend to indicate that mere rapid discharge of fluid from the intestinal canal will induce symptoms similar to those following rapid discharge of fluid from the body in blood-letting, which has never been found to induce choleraic symptoms even in those cases in which it leads to a fatal result. A difference is, however, said to exist in the conditions prevailing in the syncope of cholera, as compared with the syncope induced by non-choleraic discharges of fluid, in that in the former the assumed destruction of the epithelium is asserted to prevent absorption of fluid from the intestinal canal. Why the mere disintegration and removal of the epithelium should prevent absorption is not very clear, if, as physiologists tell us, "the process of absorption by the blood-vessels is effected by the operation of forces of a purely physical character, the chief of which are embraced under the general term Osmosis."* The destruction and removal of epithelium can only tend to increase the tenuity of the partition between the fluids in the intestine and the blood, and although the current of the latter is retarded, its viscidity is said to be increased, and its hydrostatic pressure on the walls of the vessels to be diminished. That there really is no absorption of fluid in those cases where vomiting is not so excessive as to prevent the access of any fluid to be absorbed appears to be still uncertain, and even if the non-absorption be admitted, it remains to be proved that it is dependent on the mere destruction and removal of epithelium.

Results of cultivations of non-choleraic dejecta.

218. Numerous careful experiments regarding the development of fungi in materials of diarrhœa and normal dejecta showed all the forms occurring in the corresponding series of observations on cultivations of choleraic media. The same forms of *Aspergillus* and *Penicillium* constantly recurred, and only in one single instance did any species appear which was not observed in choleraic media. This was apparently a species of *Dactylium*.—(Plate VIII, figs. 5, 6.) It occurred in a cultivation contemporaneously with a crop of *Aspergillus glaucus*.—(Plate VIII, fig. 5A.) To the naked eye it appeared in the form of dusty-brown patches scattered among the green masses of *Aspergillus*. The mycelium consisted of light-brown,

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* Carpenter's "Principles of Human Physiology," London, 1860.

Characters of *Dactylium* (?) developed in a cultivation of non-choleraic material.

closely septate, branched filaments, marked here and there throughout their course by dilatations and irregular aggregations of cells. From these filaments, as well as from the masses of cells, numerous short, erect, brown, jointed threads arose, bearing at their apices clusters of large spores. These spores were fusiform, brown and septate, (the septa being in general three in number), and on germination, gave origin to a colorless, jointed, mycelial filament from either of their extremities. The general results of all the observations and experiments on non-choleraic dejecta which I have been able to carry out have, as stated previously, shown not only that the same fungi are developed in such materials as in choleraic media, but that they more frequently contain distinct fungal elements, as characteristic features of their original condition.

Percentage of cases in which oval and circular cells like those of choleraic dejecta were present.

219. 3. OVAL AND CIRCULAR CELLS.—Cells of an oval and circular form, agreeing in characters with those which constitute such a constant and important feature in the dejecta of cholera, were present in 68 per cent. of the cases here tabulated. In only seven of these, however, were such cells abundant, and as in two of them, which were slight cases of dysentery, they almost entirely gave the normal reaction of white blood-corpuscles with acetic acid, in only 5 per cent. were cells of a doubtful nature, like the majority of those of the cholera dejecta, present in large numbers.

220. The following are the notes which were recorded regarding some of the seven cases:—

Illustrative case.

White blood-corpuscles.

CASE I, NO. 11, OF THE TABLE.—The patient was admitted into the General Hospital suffering from an attack of dysentery. The evacuation consisted of a small quantity of thick, pinkish-brown, slimy matter. The reaction was very faintly acid. On microscopic examination it was found to be composed of a fluid filled with softly molecular circular cells of the ordinary size, and giving the usual reaction with acetic acid of white blood-corpuscles. There was also a scanty sprinkling of red corpuscles present.—(Plate II, fig. 3, C.)

Illustrative case.

Masses of white blood-corpuscles.

CASE II, NO. 21, OF THE TABLE.—The patient was admitted into the General Hospital, and while under treatment was attacked with profuse watery purging. No. 21 was one of these watery dejecta. It consisted of a brown watery fluid, and a scanty sediment of yellowish powdery matter and small flocculi. The reaction of the fluid was neutral, becoming, as it dried, faintly alkaline. The fluid was full of fine *Bacteria*, the majority of the particles motionless. There were also a few active *Cercomonads*, and one or two freely crawling *Amœbæ*. The flocculi were composed in great part of brownish granular matter, and here and there showed the colorless gelatinous basis of normal choleraic flocculi. The fluid contained numerous dim half-disintegrated circular cells, some of which showed distinct nuclei; and here and there throughout the flocculi were large masses of soft, molecular, circular cells. These masses closely resembled those composed of white blood-cells, frequently to be found in the blood of cases of snake-bite, and apparently really were formed of such cells, as acetic acid produced the usual reaction when applied to them.—(Plate II, fig. 3, D.); there were also a few red corpuscles in the fluid and flocculi.

Illustrative case.

Circular cells the encysted condition of *Amœbæ*.

CASE III, NO. 6, OF THE TABLE.—This evacuation was the result of sulphate of magnesia. It consisted of about three parts of pale, greenish-yellow fluid, and one of whitish flocculent sediment containing numerous particles of undigested food. The fluid was full of large, active *Bacteria* and *Vibriones*. The flocculi were composed of the usual gelatinous basis, with numerous portions of undigested vegetable tissues and patches of fungoid cellules. In the fluid there were one or two active *Cercomonads*, with numerous free, crawling *Amœbæ*, and here and there throughout the flocculi were masses of similar bodies and of circular cells, the cells showing a distinct double outline, and being apparently the encysted condition of the *Amœbæ*, or, at all events, identical in appearance with the free crawling *Amœbæ* when they assumed that condition under observation.

Illustrative case.

Circular cells of a greenish hue.

CASE IV, NO. 56, OF THE TABLE.—The patient was suffering from a slight attack of diarrhœa. The evacuation consisted of a thick fluid of normal feculent matter. The fluid, when first applied, was of very faint acid reaction, becoming, as it dried on the paper, decidedly alkaline. It contained the usual debris of normal feculent matter, with an abundance of fine, active *Bacteria*. *Cercomonads* were present in considerable numbers, as many as twenty being present in some fields. There were also a few large *Amœbæ*, lying at rest, or emitting delicate protrusions, and an abundance of still, circular, refractive cells of various sizes. They showed every degree of definition and dimness, and as many as thirty specimens were present in some fields; some of them were colorless, others of a greenish hue; some showed distinct double outlines; some were solitary, and some in pairs, figures of 8, and irregular masses.

Illustrative case.

CASE V, NO. 59, OF THE TABLE.—The evacuation was composed of semi-fluid feculent matter of neutral reaction. It contained the usual debris, and a great abundance of active *Bacteria*. Small, active *Cercomonads* were present in large numbers, appearing more distinctly and in greater activity after the medium had been for a short time diluted with freshly boiled alkaline fluid from a choleraic evacuation. They continued in full vigor in this medium for upwards of four hours, but were at once rendered motionless and dim by the addition of a little water. There was also an abundance of circular, refractive cells, of various sizes, either scattered or aggregated into irregular masses and groups.

Many of the circular cells probably due to processes of gemmative multiplication of *Amœbæ*.

221. The nature of the cells in these and similar cases is probably various, a varying number of several distinct kinds being present, but as in many choleraic dejecta, a large number of them are apparently due to processes of multiplication and self-division in the infusoria, and specially in the *Amœbæ* so frequently associated with them. In some cases, both choleraic and non-choleraic, they present certain resemblances to oily globules, but while it is possible that they may contain some oily matter, there are several reasons which tend to show that they are not to be regarded as mere oil-globules.

Features distinguishing them from oil-globules.

Effect of acetic acid on some oil-globules.

222. The more important of these reasons are as follows:—*1st,*—They tend to sink in the fluid and accumulate as a sediment, even when they are free, and not involved in the substance of the flocculi. Oil-globules, when free, float upwards to the surface of the fluid and accumulate there (*vide* cases 10 and 22 previously quoted). *2nd,*—They almost invariably, rapidly, and completely disappear from the medium containing them, while oil-globules show no such tendency. *3rd,*—They cannot be made to melt together by means of pressure and movement, as oil-globules can constantly be observed to do. *4th.*—Acetic acid immediately affects them, destroying their refraction and distinctness at once, and ultimately reducing them in most cases to mere molecular flakes or delicate molecular rings. The hard sharp outline of oil-globules is unaffected by the action of acetic acid. The acid does, however, occasionally render such globules temporarily very dark, and causes them to appear more or less granular and puckered. This effect was very manifest in those present in such abundance in No. 22 of the table. In them, however, it could be clearly demonstrated to be due to an involution of innumerable small portions of the surrounding fluid. The size of these portions or bubbles varied, and after their formation, they gradually melted into one another, and ultimately escaped into the surrounding fluid, leaving the oil-globule which had contained them, and whose appearance they had temporarily altered, in the same condition in which it originally was. A little friction and movement very considerably accelerated this process, and showed the coalescence of the involved globules and their ultimate escape into the fluid with great distinctness. *5th.*—Ether does not produce nearly so decided an effect upon them as acetic acid. It does frequently render them more or less molecular and dim, and occasionally causes them completely to break up, but its influence on them is not at all greater than on active infusoria, which may frequently be observed to become dim, motionless, and even totally disintegrated, due to the addition of ether to the medium in which they are present. *6th.*—On the evaporation of the ether, there is no re-appearance of the cells or of oily matter derived from them. *7th.*—Cells showing all the appearances of these cells may be actually observed to be developed from the *Amœbæ* present in the evacuations.

Experiments demonstrating the development of such cells from *Amœbæ* originally present in the evacuations.

223. As this process of development appears to be capable of throwing some light on the peculiarities of appearance presented by many of the cells occurring in choleraic dejecta, it may be as well to detail the phenomena occurring in some of those cases in which it was observed to take place. The freely moving *Amœbæ* of the evacuations have on several occasions been observed to give off cells or globules identical in appearance with certain of those oil-like cells, and that at a time when they were in free active motion. The clearest demonstrations of the occurrence were, however, afforded by a series of experiments previously alluded to on the effects produced by the addition of alkaline choleraic fluid to the materials of diarrhœal and normal evacuations containing infusoria. These experiments were originally undertaken owing to the effect which such choleraic fluids were observed to exercise in increasing the activity of the infusoria in the evacuations, and their result in certain cases was the production of a material not to be distinguished from that characterising the earlier evacuations in many cases of cholera.

Illustrative case.

CASE I.—No. 38 of the table, previously quoted in detail as an example of an infusorial evacuation, was one of the cases affording materials for experiment. On reference to page 209 it will be seen that the evacuation was composed of semi-fluid feculent matter, showing the usual debris of healthy evacuations, and a scanty sprinkling of *Cercomonads* and *Amœbæ.*—(Plate VI, fig. 1), the activity of which was increased by contact with alkaline choleraic fluid. A portion of this evacuation was put into a small gallipot, some freshly boiled and filtered alkaline choleraic fluid added,* and the preparation set aside under a bell-glass.

Appearances presented on the following day.

Three classes of cells present.

On the following day the surface of the fluid was covered by a thin but consistent layer of fine bacterial matter, with a few molecular or brightly refractive circular cells. The sediment was everywhere full of cells resembling those so frequently occurring in choleraic dejecta. They were of various sizes and forms, but were divisible into three classes occurring in the following order of frequency (Plate VI, fig. 5):—*1st*, brightly refractive circular cells, solitary and in pairs, or in irregular masses of various sizes exactly like those of choleraic evacuations, and like them in certain cases showing various degrees of compression of the constituent cells. Some of the cells showed a distinct double outline and differentiation of cell wall and contents, while others appeared as mere brilliant colourless globules. Some of them presented a ring-like form, which in most cases appeared to be due to their having a flattened doubly concave figure; *2nd*, active, molecular, circular and oval *Cercomonads*, the majority being of large size and showing only feeble movement; *3rd*, circular cells with delicate tongue-like protrusions. At the point or points at which the protrusions were situated, there was generally more or less cupping or flattening of the cell, and a deficiency of the double outline which elsewhere characterised it.

Effect of re-agents on these cells.

Ether in excess stilled all movement and somewhat dimmed the cells in certain instances. Acetic acid at once dimmed them, and almost immediately converted them into mere molecular rings, containing a few granules of larger size and rapidly passing on into complete disintegration.

Number of cells present.

Several hundreds of clearly defined cells were present in the majority of microscopic fields, and the material could hardly have been distinguished from that of the early evacuations in many choleraic cases.

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* This medium contained no cells, and only a sprinkling of fine molecular matter.

Appearances presented on the following day.

On the following day there were not nearly so many cells present, and those which still remained were not so refractive or clearly defined. Many of them showed several large vacuoles.—(Plate VI, fig. 3.) They appeared to be undergoing a rapid process of disintegration, and acetic acid acted on them in the same manner as on those examined on the previous day.

Illustrative case.

CASE II.—The evacuation furnishing materials for experiment was in this case of firm consistence and neutral reaction. It contained a few large encysted *Amœbæ* and a sprinkling of small dim, motionless oval and circular cells. Two portions of it were taken and put in separate gallipots, to the first (A) some boiled choleraic fluid was added as in the previous case, and to the other (B) some of the same fluid rendered acid by the addition of a little acetic acid. Both were then set aside under the same bell-glass.

Increased number of circular cells present.

They were examined on the subsequent day with the following results. The reaction of A was alkaline. No active cells were to be seen, but the number of bright still circular cells contained in the sediment was very much greater than on the previous day, and it now appeared to be demonstrated that those of every size were due to a process of gemmation and sub-division of the large encysted *Amœbæ* originally present.—(Plate VI, fig. 2.) Very few of these retained their original circular form, and the majority showed various degrees of elongation and construction dividing them into two or more lobes. In some cases the construction was very slight, in others greater, so as to produce an hour-glass or figure of 8 outline, and in others, so far advanced, as to cause almost complete separation of the constituent lobes which only remained attached to one another by a narrow neck, while in still other instances cells were seen quite distinct from one another, but associated in pairs, and appearing as though they had resulted from a completion of the process of division. The protoplasmic contents were seen with various degrees of distinctness, in some cases being hardly visible from the encysted and refractive character of the cells, and in others clearly defined and finely molecular. In some cases the protoplasm seemed to fill the cell entirely, while in others it appeared to be irregularly shrunken from the distended capsule.—(Plate VI, fig. 2.)

Protoplasm of some cells shrunken.

Effect of re-agents.

Acetic acid at once dimmed them, rendering them finely molecular, and ultimately breaking them up entirely, except in certain instances in which, probably due to the strength of the capsule, they remained as dim, granular, circular masses. Ether had comparatively little effect upon them.

In some cases it produced a certain amount of dimming, but neither so rapidly, nor so completely as the acid did. The reaction of the other preparation (B) was acid. The sediment contained a few large, encysted, circular cells similar to those observed in the material yesterday. None of them showed any evidences of gemmation or other growth or development, and they were all dim and with shrunken granular protoplasm.

Both preparations were again examined on the following day. The first (A) showed an abundance of circular cells, but the process of development appeared in great measure to have ceased, as there were now hardly any gemmating cells, almost all of them being solitary and many of comparatively small size. Some of them were clearly defined, highly refractive and had a hard look, others showed numerous large vacuoles, and others were molecular and soft. The other preparation appeared to be quite unchanged.

Many of the cells subsequently assumed a greenish tinge.

On the next day the first preparation showed no apparent increase in the number of the cells. Many of those present (Plate VI, fig. 3,) showed vacuolation with more or less shrinking of their contents, and the peculiar greenish tinge so frequently characterising similar bodies in choleraic evacuations. Many of the larger cells appeared greatly distended, as though their contents had been increased in bulk and at the same time diluted by osmosis.

Illustrative case.

CASE III.—The evacuation furnishing the materials for examination was, to all appearance, of a healthy and normal character. Its reaction was faintly acid, and it contained the usual debris, a very scanty sprinkling of small, dim, oval, and circular cells, and a few specimens of the common encysted *Amœbæ*. A preparation with alkaline fluid was made and set aside as usual, and on the following day numerous specimens of it were examined with the following results:—The sediment showed an abundance of refractive cells of average size, some in pairs or small groups, others quite free, and exhibiting every stage of the process of gemmation and division.—(Plate VI, fig. 4.) Few of the large encysted cells observed yesterday remained in their original condition, but some were present, showing one or more bud-like protrusions proceeding from them. Some of the smaller cells showed delicate protrusions of their substance, and many of them were of the greenish tinge observed in those of case 2.

Appearance of greenish cells.

Effect of re-agents.

Acetic acid at once dimmed the cells, and ultimately ringed or completely destroyed them as usual. Ether produced comparatively little effect, some of the cells remaining quite unaffected, while others were dimmed or ringed in various degrees, but not by any means more affected than active *monads* contained in another solution were. Carmine produced very little coloration, a few cells becoming dyed, but the majority remaining almost unaltered. In regard to this re-agent, as with regard to the ether, the effect, though slight, was quite as strong as on active *monads* and *Amœbæ* of other materials.

This process of development is capable of explaining many of the peculiar appearances presented by certain cells in choleraic dejecta.

224. Numerous experiments of a similar nature to the above gave, almost without exception, similar results, and appeared to be capable of explaining the peculiar appearances presented by many of the cells frequently present in choleraic dejecta. It is easy to see that the few active or encysted *Amœbæ* frequently present in normal dejecta, and consequently frequently present in the intestinal canal, may by processes of gemmation similar to those observed in these experiments give rise to a very large number of smaller cells, when they are supplied with a congenial medium, such as the alkaline choleraic fluid appears to be.

Formation of masses.

225. The resulting cells will naturally vary with variations in the process which gives rise to them. A process of internal sub-division taking place in a strongly encysted cell will naturally tend to the formation of a mass of cellules rendered more or less irregular or angular by mutual pressure within the resistent capsule. When, on the other hand, the cells, as they are produced, are not confined, but at the same time remain in contact, they will tend to form one of those irregular masses of circular cells which frequently occur in choleraic and diarrhœal dejecta. The processes of

of lobed cells,

of cupped, flattened,

and irregular cells.

Formation of chains of "macroconidia."

Effect of osmosis.

gradual division of elongated cells will give rise to all those forms characterised by an hour-glass or figure of 8 contour. If the constriction of the wall of the original cell be completed, and the resulting cells subsequently separated, they will be of a regular circular form; but if after the complete division of the protoplastic contents — which certainly frequently occurs long before complete constriction of the capsule — anything happens to cause rupture of the investing layer along the line of junction of the two lobes, the result will be the formation of two cells more or less flattened or cupped on one side, and liable at this point to the protrusion of the contents dependent on their growth or distension with absorbed fluid. If the progress of gemmation is farther continued before such a process of separation occurs, so that in place of two there are three or more associated, and only partially differentiated cells, the result will be the formation of doubly or irregularly cupped and flattened cells, many of which will be liable to show two or more protrusions. If the process of gemmation be carried on in one direction, or in two exactly opposite directions, and if the separation of the cells be not completed, the result will be the formation of structures resembling the chains of macroconidia described by Professor Hallier, and the concatenate series of cells frequently observed in the dejecta of cases of cholera and diarrhœa in Calcutta. Finally, processes of osmosis and dilution will account for the appearances presented by those cells in which the contents are irregularly vacuolated or shrunken from their investing capsule.

4. Miscellaneous bodies occurring in non-choleraic dejecta.

226. It is needless to occupy farther space in describing other bodies occurring in non-choleraic dejecta, as any description would merely involve a repetition of what has been previously recorded regarding the miscellaneous bodies occurring in the dejecta of cholera.

General conclusions derivable from a comparison of the characters of healthy and diarrhœal dejecta.

227. The general conclusions to be derived from the comparison of the characters of choleraic and non-choleraic dejecta appear to be that as yet there is no evidence of the existence of any specific cells, or other bodies peculiar to the former and never to be found in the latter, but that there is distinct evidence that many of the peculiarities of choleraic dejecta are due to a great increase in the development of certain classes of cells, common to them and to non-choleraic materials, and both intrinsic and extrinsic to the organism, and that, as regards the extrinsic cells at all events, this increased development may be ascribed in great measure to the presence of a favorable medium in the fluid which is effused from the blood.

NOTE A.

RESULTS OF MICROSCOPIC EXAMINATION OF SPECIMENS OF WATER IN VARIOUS PARTS OF THE MADRAS PRESIDENCY.

1. *Water from Mess-House Tank, Perambore, Madras.*—"This water is said to be peculiarly productive of guinea-worm and has not lately been in use."

Molecular flakes.
Monads.
Zoospores.
Vorticella.
Cysts.
Heteromita.
Amœba.
Bacterium.
Paramecium.

The water was turbid and of a dirty greenish-yellow colour. After standing for 18 hours, the turbidity remained undiminished. It had no smell, and hardly any sediment. The small amount of sediment which was present showed numerous amorphous sandy particles, but very few evidences of the presence of organic life. The only organic matters present in any abundance consisted of elongated, finely molecular flakes, in which numerous colourless, refractive, and seemingly encysted circular cells of small size were embedded. A few active cells of similar size and appearance, and one or two brownish zoospores, were moving rapidly through the fluid. One small-sized green *Vorticella*, and a few peculiar pedicillate colourless cysts, containing numerous protoplasmic masses in their interior, were also seen. Although preparations of this water were examined in the beginning of December 1870, and again in February 1871, no filariæ could be detected in any of them. A specimen from the surface of the fluid showed a sprinkling of minute granules, one specimen of a small form of *Heteromita*, one small *Amœba* with a distinct contractile vesicle, a few large *Bacteria*, and one or two very active bodies, apparently referable to *Paramecium*, or *Chilodon*, but moving so rapidly as to prevent their identification.

2. *Water from Left Wing Lines, Perambore.*—This water was found to be very impure on chemical examination during the outbreak of cholera in 1870 among the men of the Native Infantry Regiment stationed at Perambore. "It is chiefly used for culinary purposes, but occasionally as drinking water."

Molecular matter.
Coleps.
Anthophysa.
Encysted cells.

The water was turbid, of a yellowish colour, free of smell, and with a mere trace of deposit. All throughout it there was much fine, actively moving molecular matter, the component particles being solitary or associated in pairs or trios. There was also a sprinkling of very minute circular bodies, each of which contained a highly refractive granule. A few large specimens of *Coleps* (*vide* Plate IX, fig. 119) were also present, and in one specimen a considerable quantity of *Anthophysa Mülleri* (*vide* Plate V, fig. 1). Beyond these, and one or two small colourless, encysted cells, nothing could be detected.

3. *Water of the Right Wing Lines, Perambore.*—This water, when examined at the same time as No. 2, was like it found to be very impure. "It is considered good, and is largely used for drinking purposes."

Algæ.
Entomostraca.
Coleps.
Monads.

The water was perfectly clear, of a faint greenish tinge, with no perceptible sediment and no smell. Specimens taken from the bottom showed very little. A few particles of sand, a little molecular matter, and a sprinkling of peculiar green algoid filaments were present (*vide* Plate IX, fig. 56). They were of small size, distinctly jointed, and terminated at either extremity by a colourless lance-shaped cell. The coloured cells contained in their interior two to four distinct granules. There were also one or two minute *Entomostraca*, and a few specimens of *Coleps*, also a single specimen of a peculiar monadiform body, of a flattened triangular shape with three vibratile filaments proceeding from the apex, and a curious projection at one extremity of the base (*vide* Plate IX, fig. 84). Specimens from the surface of the water showed a sprinkling of the green lance-headed filaments previously described, and a few minute, active circular and oval *Monads*.

4. *Water from the Cooum.*—This water was quite transparent, but of a slight bluish-brown opalescent tinge, and with a considerable sediment and faint disagreeable odour. The sediment was found to consist in greater part of amorphous brownish matter, with a considerable amount of free molecular matter, minute darting specks and active *Bacterium*. There were also numerous specimens of *Pleurosigma* and other diatomaceous forms; a small number of minute and very active greenish *Oscillatorian* filaments (*vide* Plate IX, fig. 52), and one or two filaments of *Lyngbya*, identical with that of Plate IX, fig. 55. One specimen of an elongated active monad (Plate IX, fig. 79) and one large cystoid body full of cellules were also seen. Specimens from the surface showed a slight film, consisting of very fine molecular and *Bacterial* matter, the latter extremely active. There were also numerous large *Vibriones*, some very active two-celled bodies, each of the component cells, containing a highly refractive granule, and a few minute oval and circular monads.

Molecular matter.
Bacterium.
Diatoms.
Oscillaria.
Lyngbya.
Monads.
Vibriones.

5. *Water from a well in the Madras Penitentiary.*—This water is esteemed of good quality by the natives.

It was transparent, colourless and odourless, and contained a mere trace of sediment. Specimens from the lower portion of the fluid showed very little. A few cotton fibres, portions of decomposing vegetable tissues, and particles of sand were present. One or two small, colourless, circular and oval *Monads*, one small very active paramecioid body, a few specimens of a *Difflugia* (Plate IX, fig. 101), and one large *Actinophrys* (Plate IX, fig. 109) were detected. No contractile vesicle could be seen in the latter. Specimens from the surface merely showed a trace of fine molecular matter and minute active *Bacterium*, with a solitary specimen of *Cyclops*, apparently *Cyclops quadricornis*.

Monads.
Difflugia.
Actinophrys.
Cyclops.
Bacterium.

6. *Water from a well in the Madras Penitentiary.*—This water is said to be very bad. It had no smell, but was of a greenish colour and full of fine greenish flocculi. Specimens from the lower portion of the fluid showed abundant flakes of fine molecular matter, in which, in some cases, small circular cells were embedded, and of filaments of *Oscillaria* and *Lyngbya* of various sizes and greenish colour. One specimen of a large rotifer, seemingly a species of *Euchlanis*, was present.

Molecular flakes.
Oscillaria.
Lyngbya.
Euchlanis.

7. *Water from a well in the Madras Penitentiary.*—This water was colourless, transparent, with a faint odour, slight brackish taste, and a mere trace of sediment. Specimens from the lower portion of the fluid showed very little. A sprinkling of cotton and other vegetable fibres and a few portions of disintegrating vegetable cellular tissue present, some of the latter being permeated by delicate mycelial threads. There were also present considerable numbers of *Cyclidium glaucoma* (*vide* Plate IX, fig. 133), and of minute *Heteromitæ*, and a few very minute navicular *Diatoms*. Specimens from the surface showed only a few minute filaments of *Beggiatoa*.

Cyclidium.
Heteromita.
Diatoms.
Beggiatoa.

8. *Water from a tank near the sewage farm, Perambore.*—The surface of this tank was covered in many places with a luxuriant growth of *Pistia stratiotes*, and it was from among the rootlets of specimens of this plant that the greater number of the organisms enumerated were obtained. The most abundant and characteristic forms present were—1*st*, a larger species of *Arcella* of a brown colour (*vide* Plate IX, fig. 103); 2*nd*, a species of *Vaginicola* (*vide* Plate IX, fig. 127). Some loricæ contained two polyps, others only one. 3*rd*, *Amœbæ* of considerable size, but apparently unprovided with contractile vesicles; 4*th*, a large species of rotifer, apparently belonging to the family *Flosculariæa*. The lorica distinctly annulated and semi-transparent, and the superior margin of each annulus marked by a row of granules; 5*th*, numerous *Diatoms* of various species; 6*th*, greenish filaments of *Lyngbya and Oscillaria*. In addition to these more abundant forms, one specimen of a large species of *Euglena* (*Euglena spirogyra*?) (Plate IX, fig. 91), one of a large bright green *Crumenula* (Plate IX, fig. 89), and one of a species of *Monostyla*, together with oval and circular *Monads* of various sizes, some large, circular and with short flagella (Plate IX, fig. 77), others very minute and oval, were detected. There were also a few specimens of a species of *Zoothamnium* (Plate IX, fig. 122).

Arcella.
Vaginicola.
Amœbæ.
Rotiferæ.
Diatoms.
Oscillaria.
Lyngbya.
Euglena.
Crumenula.
Monostyla.
Monads.

9. *Water from a tank in a hutting ground near the sewage farm.*—The surface of this tank was covered with a thick scum, of a bright green colour and closely resembling green oil-paint in appearance. The specimen of water containing some of this material gave out an intensely disagreeable animal odour when the bottle containing it was opened. The green colour was found to be due to an immense number of minute algoid cells, *Clathrocystis*. (?) These were aggregated into hollow, more or less irregularly globular masses, each mass having numerous openings from the outer surface to the central cavity. The component cells were in most cases very minute, but there were also a certain number of larger cells which presented appearances apparently demonstrating that the smaller cells were due to a continued division of their contents. In the figure (Plate IX, fig. 48) one of these larger cells is shown highly magnified. It is much dilated, and the process of content division has proceeded so far as to produce a collection of cellules like those free in the fluid, each of which consists of three or four greenish granules surrounded by a special investment.

Clathrocystis.

10. *Water from the tank at the cart-stand in Sydenham's Road, Choolay.*—This water was turbid, of a dirty yellow colour, and deposited a slight sediment. This sediment was found to consist almost entirely of stems of *Anthophysa*, only a very few heads remaining *in situ*. There was little sand or other inorganic matter present. Among the *Anthophysa* stems numerous active infusoria were present. The most abundant and characteristic forms were the following, arranged in order of prevalence:—1*st* (Plate IX, fig. 114), peculiar bell-shaped bodies, with a retractile oral process, and a circle of coarse cilia around it; they were extremely active, sometimes crawling by means of their cilia, and at others revolving with great rapidity through the fluid by means of the energetic action of the same processes; 2*nd*, small disciform *Diatoms* containing greenish granules; 3*rd*, specimens of *Coleps* (*coleps hirtus*) like that of fig. 119, Plate IX; 4*th*, a few specimens of a large species of *Actinophrys* (Plate IX, fig. 106); there was a distinct gelatinous coating around each cell; 5*th*, active specimens of *Chilodon cucullulus*? similar to that of Plate V, fig. 2.

Anthophysa.
Diatoms.
Coleps.
Actinophrys.
Chilodon.

11. *Water from a tank near some huts, Ashtaboogum Road, Choolay.*—The colour of this water was dirty yellow, and on standing it deposited a considerable sediment. This sediment was found to consist mainly of angular sandy particles with abundant fine molecular matter. The only form of infusoria which was present in any abundance consisted of the common *Pleuromonas* (*Pleuromonas Jaculans*, *vide* Plate V, fig. 6, A). Of this there were numbers of specimens, some still attached by their posterior filament and moving in the normal jerking manner, others swimming

Pleuromonas.
Heteromita.
Vorticella.
Cyclidia.

free, like small *Heteromitæ*. A few active, free *Vorticella* heads and *Cyclidia*, and one peculiar green *Cryptomonad* (Plate IX, fig. 85). The body was triangular, with thickened margins, and was twisted on itself in a screw-like manner. A red eye-speck, delicate flagellum, and nuclear body present. Its movements were active, progression being accompanied with revolution on its long axis.

Monads.

12. *Water from the tank near the bazaar, Palaveram.*—This water was of a yellowish tinge, but quite transparent and depositing no sediment. Examined microscopically, it showed scarcely anything: a sprinkling of active granules and a few small oval and circular monadiform cells. They were of various shades of green and brown, and of various degrees of activity (Plate IX, fig. 78).

Monads.
Diatoms.
Beggiatoa.
Actinophrys.

13. *Water from a well near the priest's compound, Palaveram.*—This water was transparent, odourless and colourless. There were one or two small fragments of sediment, which on examination proved to be portions of disintegrating vegetable cellular tissue. The only other bodies detected were a few angular fragments of sand, one or two very delicate filaments of *Beggiatoa*, one small navicular *Diatom*, and some minute colourless *Monads* and specimens of *Actinophrys*.

Cyclidia.
Monads.
Bacterium.

14. *Water from another well at Palaveram.*—This water was transparent, colourless and odourless, without any perceptible sediment. Microscopic examination showed almost nothing. One small patch of molecular matter and sandy particles was found. In and around this a few *Cyclidia*, green oscillatorial filaments, minute *Monads* and *Bacteria* were present. The *Monads* were both active and still, and the *Bacteria* were mostly composed of three to four joints.

15. *Water from a well on the east side of the cantonment.*—This water was transparent, colourless and odourless, and did not show even a trace of sediment. Microscopic examination afforded hardly any results. A few small particles of sand, one or two moving granules, solitary or in pairs, and one small colourless, encysted circular cell were all that could be detected.

16. *Water from a well near the depôt barracks.*—The water was perfectly clear, colourless and odourless, and without the slightest trace of sediment. Microscopical examination showed a few particles of laterite dust, and one or two small fragments of disintegrating vegetable cellular tissue.

Molecular flakes.
Pleuromonas.
Diatoms.
Monads.

17. *Water from the well in front of the midwifery ward.*—This water was transparent, colourless, odourless, and had a very little greyish deposit. This deposit was found to consist of flakes of fine molecular matter, with cotton fibres, portions of vegetable cellular tissue, angular fragments of sand, and grains of laterite embedded in it. There was little evidence of the presence of animal or vegetable life in it. Around the edges of the flakes of sediment were a few free and attached specimens of the common *Pleuromonas*, while in their substance, embedded in the molecular matter, there was a scanty sprinkling of colourless encysted circular cells of various sizes, with a few small *Diatoms*, the latter almost all dead. One specimen of a curious monad, with the anterior extremity prolonged into a slender projecting process bearing the flagellum, was also seen.

Entomostraca.
Pleuromonas.
Cyclidium.
Chilodon.

18. *Water from the well in front of No. 4 hospital, Palaveram.*—This water was transparent, colourless and odourless. It contained a few active *Entomostraca* and deposited a few fragments of sediment of a greyish colour. This sediment consisted in greater part of fragments of dead crustaceans, more or less mixed with particles of sand, and a few branched colourless mycelial filaments. The *Entomostraca* belonged to some genus of *Cyclopidæ*, apparently *Canthocamptus*. In and around the dead specimens were myriads of *Pleuromonads*. There were also a considerable number of masses of encysted cells of various sizes, and a few active specimens of *Cyclidium* and *Chilodon*.

Monads.

19. *Water from a well in the native parcherry (the dhobie village previously alluded to), Palaveram.*—This water was transparent, colourless and odourless, with only an extremely scanty trace of sediment. Microscopically it showed no evidences of impurity. A few fragments of disintegrating vegetable tissues and one or two minute circular *Monads* composed almost all the organic structures visible.

Entomostraca.
Chilodon.
Bursaria.
Spirostomum.
Holophrya.
Diatoms.
Pediastrum.
Staurastrum.
Scenedesmus.
Oscillaria.

20. *Water from the new reservoir, Ootacamund.*—This water in the autumn of 1870 showed unequivocal signs of organic pollution, due either to the in-washing of material from the adjoining cultivated ground, or to the death and decay of submerged grass and weeds. It was of a brownish colour, probably due to the peaty nature of the soil from which it drains. *Entomostracous Crustacea* were present in enormous numbers, with large ciliated infusoria of various kinds. The majority of the latter belonged apparently to the genera *Chilodon* (Plate IX, fig. 115), *Spirostomum* (Plate IX, fig. 126), *Bursaria* (?) (Plate IX, fig. 113), and *Holophrya* (Plate IX, fig. 124). There were also numerous elongated, sessile diatoms, a few specimens of *Pediastrum tetras* (Plate IX, fig. 14), and of a species of *Staurastrum* (Plate IX, fig. 15), an abundance of minute *Scenedesmi* (Plate IX, fig. 21), and one or two bright green filaments of *Oscillaria* (Plate IX, fig. 54).

Beggiatoa.
Chlamydomonas.
Dinobryon.
Staurastrum.
Rotiferæ.
Amphileptus.
Vorticella.

21. *Water from the Dodabet reservoir, Ootacamund.*—This water was transparent, almost colourless, and deposited a little sediment composed of isolated fragments. These fragments were found to consist almost entirely of portions of disintegrating vegetable cellular tissue, with a few filaments of *Beggiatoa*. Among and around the fragments of sediment were numerous bright green specimens of *Chlamydomonas*, with four delicate flagella (Plate IX, fig. 46), an abundance of minute greenish and colourless monads, and a few specimens of two species of *Staurastra*; one colony of *Dinobryon sertularia*? (Plate IX, fig. 92) was detected; also one or two small *Rotiferæ*; two specimens of a large *Vorticella*, and a few small specimens of *Amphileptus*.

Desmids.
Pediastrum.
Cœlastrum.
Scenedesmus.
Monads.
Paramecium.
Diatoms.
Confervæ.
Oscillaria.
Chætonotus.
Tank-worms.

22. *Water from the lower end of the lake, Ootacamund.*—This was transparent, colourless and deposited a slight amount of greenish sediment. The greater part of this sediment was found to be composed of *Desmidieæ* of various kinds, *Cosmarium, Staurastrum, Ankistrodesmus, Closterium, Docidium,* &c. (Plate IX, figs. 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 15, 17, 19, 24, 26, 29, 31, 34, 35). There were also a few specimens of *Pediastrum tetras* (Plate IX, fig. 14), and of a larger species with deeply incised lobes (Plate IX, fig. 41), and numerous specimens of a species of *Cœlastrum*? (Plate IX, fig. 53), and of various species of *Scenedesmus*, (Plate IX, figs. 16, 20, 22). There were, in addition to the above, numerous masses of green cellules (Plate IX, fig. 38), an abundance of *Diatoms* of various kinds, a few colourless *Monads* and bright green *Paramecia*, one or two small tank-worms, and specimens of a peculiar species of *Chætonotus*? and a few filaments of *Confervæ* and *Oscillariæ.*

Desmids.
Hormiscia.
Stentor.
Polytoma.
Amœba.
Euplotes.

23. *Water from the lake, Ootacamund.*—This specimen was taken from immediately above the Willow-bund. It was of a faint yellowish tinge, contained much fine suspended matter, and deposited a considerable quantity of brownish sediment. The sediment was found to consist mainly of brownish, amorphous, granular matter and disintegrating vegetable tissues. There were numerous *Desmids* present, but they were by no means so abundant as those in No. 19, and did not form so prominent a characteristic in the sediment. The species were generally identical with those of No. 19, but there were also one or two, not previously observed, among which were an elongate slender *Closterium* (Plate IX, fig. 33), and a species of *Gonatozygon* (Plate IX, fig. 36). In addition to the above algæ, there were numerous filaments of *Hormiscia*? (Plate IX, fig. 71). The most characteristic feature in this water was, however, the number and variety of animal forms present. The most remarkable of these were two species of *Stentor*, one of very large size (Plate IX, fig. 130); abundant greenish-yellow masses of *Polytoma*? large *Amœbæ*, of various forms (Plate IX, figs 108, 95); specimens of *Euplotes*, like those subsequently found at Bellary (Plate IX, fig. 112). and of a peculiar body, apparently belonging to the family *Ichthydina* (Plate IX, fig. 123).

Beggiatoa.
Lyngbya.
Rotiferæ.
Chilodon.
Coleps.
Euglena.
Monads.

24. *Water from the river Salem,*—This specimen was procured at a ghât in the town, where many natives wash and procure their drinking water. It was of a faint yellowish tinge, and had a slight, disagreeable smell. It deposited a little sediment of a sandy look, and after standing for some hours showed a delicate film on the surface. The sediment was mainly composed of angular particles of sand. Both animal and vegetable forms were present only in very small amount. There were a certain number of delicate colourless filaments of *Beggiatoa*, and one or two of a very large *Lyngbya*, previously found in tank waters in Calcutta (Plate IX, fig. 61). *Diatoms* were present in considerable numbers, the prevailing form being of considerable size and elongated outline. There were also a few *Rotiferæ*; one or two specimens of *Chilodon, Coleps* and *Euglena Viridis*, and a sprinkling of circular encysted cells, solitary or in small masses, and colourless or of various shades of brown and yellowish. The film on the surface showed much fine molecular matter and a sprinkling of small oval and circular *Monads.*

Diatoms.
Chilodon.
Amphileptus.
Monads.

25. *Water from Kichipolum well, Salem.*—This well is in considerable use as a source of supply of drinking water. The natives say that the quality of the water is not good. It was colourless, transparent, odourless, and deposited a slight amount of sediment. The sediment consisted almost entirely of sand, with a small amount of amorphous, brown, granular matter. Very few organisms, either animal or vegetable, could be detected. The only form which was at all abundant was a good sized disciform *Diatom*. There were also a few specimens of *Chilodon* and *Amphileptus*; one or two other species of *Diatoms*, and a sprinkling of minute *Monads* and molecular matter.

Hormiscia.
Diatoms.
Rotiferæ.
Chilodon.
Cyclidium.
Vorticella.
Cypris.
Coleps.
Pediastrum.

26. *Water from Chitra Savody well, Salem.*—This water was colourless, transparent, and odourless. There was a slight sediment of a green colour composed of materials from the sides of the well. The deposit consisted in great part of filaments of *Hormiscia*, like those found in No. 23, and of masses of stiped *Diatoms*, and free frustules detached from them. There were also a few *Rotiferæ*, numerous specimens of *Chilodon* and *Cyclidium*, and one or two of a small species of *Vorticella*, of a *Cypris*, of the common *Coleps*, and of a small *Pediastrum.*

Encysted cells.

27. *Water from a well at Yercaud, Shervaroy Hills.*—This water was clear, colourless, odourless, and deposited a mere trace of sediment in the form of a few isolated yellowish fragments. These fragments were found to consist of masses of cells of various sizes, of circular outline save where rendered irregular by mutual pressure, in various stages of encystment, and of various shades of colour, ranging from colourless and pale yellow to well-marked brown.

Diatoms.
Staurastrum.
Cyclidium.
Rotiferæ.
Euglena.
Cyclops.

28. *Water from the pond below the church, Yercaud.*—This water was of a faint yellowish tinge and deposited a considerable amount of sediment. The sediment consisted mainly of amorphous, brownish, granular matter, with numerous angular fragments of sand, and a sprinkling of portions of disintegrating vegetable tissues. Among the flakes of sediment there were a few specimens of a small *Staurastrum*, and of the stipitate *Diatom* so common in No. 26; one or two active *Cyclidia*, and specimens of two species of *Rotiferæ*; numerous active specimens of *Euglena viridis* (Plate IX, fig. 88), and one or two of *Cyclops quadricornis.*

29. *Water from the Alsoor tank, Bangalore.*—This specimen contained some of the grass from the edges of the tank, and one or two specimens of a minute dark-coloured *Planorbis.* The water was of brownish colour and retained a considerable amount of suspended matter, even after standing for several hours, and depositing a considerable amount of sediment. The sediment consisted principally of angular particles of sand with many molecular flakes, and large numbers of filaments of *Oscillaria*, *Beggiatoa* and *Hypheothrix* of various sizes. There was a considerable amount of fine *Bacterium* and numerous active, darting molecules present. *Diatoms* of various forms, some of which were borne on beautifully branched stipes, were abundant. A few *desmids* were also present, the commonest forms being two species of *Cosmarium* (Plate IX, figs. 11, 18). *Amœbæ* of considerable size, but unprovided with any contractile vesicle, and a few small *Difflugiæ* were also present (Plate IX, fig. 100). A few specimens of *Euglena spirogyra*? (Plate IX, fig. 91) and of a species of *phacus* (Plate IX, fig. 86), both of which had been previously found in tank water in Madras, were observed. There were also numerous small, active oval and circular *Monads*, a few of larger size and with somewhat rigid flagella (Plate IX, fig. 80), one or two *Heteromitæ*, (Plate IX, fig. 81), *Pleuromonads*, *Cyclidia*, and small specimens of *Actinophrys*, with small patches of green *Clathrocystis*, and a few specimens of *Spirostomum* (Plate IX, fig. 126). A single average sized specimen of *Pandorina* was also detected.

Oscillaria.
Lyngbya.
Hyphcothrix.
Bacterium.
Diatoms.
Desmids.
Difflugia.
Euglena.
Phacus.
Cyclidia.
Monads.
Heteromita.
Pleuromonas.
Clathrocystis.
Pandorina.
Actinophrys.
Spirostomum.

30. *Water from a well in Bangalore.*—Said to be of good quality and free from brackishness. This water was clear, colourless and odourless, with a mere trace of sediment. The sediment was found to consist of angular fragments of sand and amorphous particles. A few minute active *Monads* and some specimens of *Cyclidium* were present. At one point, where there was a semi-disintegrated fragment of some insect, a small group of minute colourless *Astasiæ* were observed, at first in full activity, and afterwards circular, still, and seemingly undergoing encystment. A solitary specimen of what appeared to be a species of *Ichthidium* was also noted.

Monads.
Cyclidium.
Astasia.
Ichthidium.

31. *Water from the large tank, Toomcoor.*—This water was of pale-yellowish tinge, deposited a considerable amount of yellowish-brown sediment, and showed patches of green scum on the surface. The green patches were found to consist of *Clathrocystis*, apparently identical with that occurring in Madras and figured previously (Plate IX, fig. 48). Among the cellules of this were a few specimens of a small species of *Vorticella*, and numerous sluggish *Amœboid* cells of small size (Plate IX, fig. 94). The latter bodies were each provided with a contractile vesicle showing contraction at regular intervals. They slowly changed form and emitted lobed protrusions occasionally. In the same situation there were also small numbers of large *Bacteria* with three or four joints. The sediment was found to consist in great part of brownish, amorphous molecular masses, with numerous delicate, free, and attached filaments of *Leptothrix*. A few *Diatoms* and large brown, circular encysted cells, and numerous specimens, alive, dead, and in various stages of disintegration, of *Cyclops quadricornis* were also present. Within the body of one of the dead specimens a solitary specimen of *Euglena viridis* was moving actively about.

Clathrocystis.
Vorticella.
Amœba.
Bacterium.
Leptothrix.
Diatoms.
Euglena.
Cyclops.

32. *Water from the tank at Cora.*—This water was turbid, of a dirty reddish-yellow colour, and deposited a considerable amount of red sediment. It was, however, odourless and tasteless. The sediment was found to consist of sandy particles and red amorphous earthy masses, with a profusion of stems of *Anthophysa Mülleri* in various stages of development. A few retained their heads *in situ*, while free heads and separate monads abounded in the fluid. All throughout the fluid were abundant minute darting specks, and active *Cyclidia*, many of which exhibited all stages of self-division. One large colourless *Astasia*, and a few *Amœbæ* like those previously observed in Bangalore tank water, with a few large circular colourless *Monads*, were also observed.

Anthophysa.
Cyclidia.
Astasia.
Amœba.
Monads.

33. *Water from the well at Timmarajanahully.*—This water was colourless, transparent and odourless, with a mere trace of sediment. The small particles of sediment present were found to consist principally of angular sandy particles with a few fragments of disintegrating vegetable tissue and some amorphous granular matter. Hardly any evidences of the presence of living animal or vegetable organisms were to be found. One or two very delicate filaments of *Beggiatoa*, one *Cyclidium*, and a few *Pleuromonads* and minute specimens of *Actinophrys* (Plate IX, fig. 104) were all that could be detected.

Beggiatoa.
Cyclidia.
Pleuromonas.
Actinophrys.

34. *Water from Lingamhully.*—This water was of a pale-yellowish colour, with a considerable amount of sediment of buff-coloured flocculi, and numerous fragments of a similar nature suspended in it. It was odourless, and without perceptible taste. The sediment was found to consist almost entirely of masses of branched stems of *Anthophysa*, of the usual shades of brown and yellowish, bearing numerous active heads in various stages of development. The fluid between the stems was full of detached heads, some entire and others in various stages of breaking up, while numbers of free monads, oval and circular, were swimming actively about and going through the usual processes of breaking down, division, &c. There were also numerous *Pleuromonads* and a sprinkling of angular particles of sand. Besides these bodies, one small collection of greenish cellules, and one specimen of a small bright-green, red-stigmaed body (Plate IX, fig. 87), apparently a species of *Phacus*, were seen.

Anthophysa.
Pleuromonas.
Phacus.

Anthophysa.
Pleuromonas.
Vorticella.
Amœba.
Oscillaria.

35. *Water from the well at Tabbad Begoor.*—This water was colourless and transparent, with a little buff-coloured sediment, and a few fragments of similar nature diffused through it. The sediment, like those of the specimens from Cora and Linganhully, consisted in greater part of entangled masses of *Anthophysa* stems, among which amorphous granular matter, and angular particles of sand were entangled. In addition to the stems and monads of the *Anthophysa*, there were numerous active, free, and attached specimens of *Pleuromonas*, a few large, active and very irritable *Vorticellæ*, one or two *amœboid* bodies with pseudopods running out into delicate threads (Plate IX, fig. 105), and a few green filaments of *Oscillaria*.

Bacterium.
Beggiatoa.
Amœba.
Diatoms.
Stylonychia.

36. *Water from the river, Clospett.*—This water was transparent, colourless and odourless, with a mere trace of sediment in the form of a few minute yellowish particles. The sediment was found to consist almost entirely of angular particles of sand, embedded in amorphous, brownish-yellow, granular matter. There were also a few fragments of semi-disintegrated vegetable cellular tissue. Animal and vegetable infusorial forms were present in very small numbers. There were only a few minute *Monads*, *Amœbæ*, very delicate filaments of *Beggiatoa*, and active darting molecules and *Bacteria*; one or two *Diatoms*, one large *Stylonychia*? (Plate IX, fig. 118), and one large colourless, monadiform body (Plate IX, fig. 83) with a long delicate flagellum, and attached posteriorly by a short, apparently twisted, pedicle.

Fungal cells.
Amœba.
Lyngbya.
Pandorina.
Zoospores.
Euglenæ.
Monads.
Tank-worms.

37. *Water from the tank near the Jail, Mysore.*—This water was odourless, slightly turbid, of a faint greenish tinge, and with a slight sediment. The sediment was found to consist in great part of disintegrating vegetable tissues, with numerous small aggregations of starch granules. In some of the fragments of vegetable tissue distinct fungal cells, of a brownish colour, were visible, from which delicate colourless threads passed out into the fluid. One large, fusiform, multiseptate spore was also observed free, and giving origin at either extremity to a mycelial filament. Throughout the preparation there was much active molecular matter, and a sprinkling of minute *Amœbæ*, each of the latter provided with a distinct contractile vesicle. In one place a patch of green *Lyngbya* (Plate IX, fig. 55) filaments was observed. There were numerous specimens of brown, circular bodies of great activity, and seemingly of the nature of zoospores; a few large active, 32-celled *Pandorinæ* (Plate IX, fig. 69); numerous minute oval and circular *Monads*, one or two large *Stylonychiæ* ? (like that of fig. 96), a few specimens of *Euglena viridis*, one of *Euglena spirogyra*, and one or two small tank-worms (Plate IX, fig. 125).

Diatoms.
Cyclidia.

38. *Water from Karangie Tank.*—This was colourless, almost perfectly transparent, and deposited only a very slight sediment. The sediment was found to consist almost entirely of angular particles of sand, and showed a mere trace of animal or vegetable organisms. The only forms of infusoria observed were a few *Diatoms* and one or two active *Cyclidia*.

Leptothrix.
Bacterium.
Ophiocytium.
Botryococcus.
Merismopedia.
Glœococcus.
Diatoms.
Coleps.
Monads.
Chilodon.
Aspidisca.

39. *Water from the large tank into which the drainage from the town passes.*—This water was turbid, of a faint brownish tinge, with a slight disagreeable smell, and deposited a large amount of soft brownish sediment. Microscopic examination showed much less development and variety of infusorial forms than might have been expected. The sediment was composed in greater part of brown, amorphous, granular matter, with numerous fragments of vegetable tissue, oil globules, &c., and in fact to all appearances was of an excrementitious nature. The most prominent and abundant organisms were—1*st*, irregularly lobed masses of greenish cellules with a considerable amount of investing gelatinous material, and closely resembling the figures of *Botryococcus*, given by Rabenhorst; and 2*nd*, large plates of *Merismopedia*, the component cellules of which were colourless and very minute (Plate IX, fig. 68). There were also numerous aggregations of pale bluish-green cellules invested in gelatinous matter, and possibly forming a stage in the development of the larger masses previously alluded to (Plate IX, fig. 64). Active specimens of *Glœococcus*? were also present in large numbers (Plate IX, fig. 66), with a few small *Diatoms*, specimens of *Coleps*, and large globular *Monads* with lobulated greenish contents. One full-sized specimen of *Chilodon*; one of *Aspidisca*; one small collection of green cellules situated on a delicate, branched filament (Plate IX, fig. 65); one spirally coiled green filament of *Ophiocytium*? and one body consisting of a series of green cells arranged in a spiral curve and invested by a gelatinous coating (Plate IX, fig. 47) were observed. All throughout there was much free molecular matter, darting specks and granules, with a few small *Bacteria*, one or two patches of fungoid mycelium, and some long colourless filaments of *Leptothrix*.

Cyclidium.
Pleuromonas.
Anthophysa.
Amœba.
Monads.

40. *Water from the springs in Poorniah's Channel.*—This water was transparent, colourless and odourless, with only a slight trace of sediment. A few active specimens of *Cyclops* were swimming freely in the fluid. The sediment showed very little on microscopic examination, although as much of it was collected as possible. What little there was of it appeared to be composed of angular fragments of sand, with a few small fragments of disintegrating vegetable tissues, and granular starch. In the neighbourhood of the latter constituents there were a few specimens of *Cyclidia*; great numbers of free and attached *Pleuromonads*, one or two stems and free and attached heads of *Anthophysa*, and a sprinkling of minute *Amœbæ* (Plate IX, fig. 99), and active *Monads* of small size. One large greenish *Monad*, like those present in the water of the large tank, and one *Chilodon*, were also detected.

41. *Water from Veernagerry Soobahi draw-well.*—This well is situated in the eastern part of the town. The water is used as drinking water. The water-level was 30 feet from the surface, and the depth of water was 10 feet.

Cyclidia.
Pleuromonas.
Vorticella.

This water was clear, colourless, and with a mere trace of sediment. Microscopically it showed very little, save a few grains of sand, one or two fragments of vegetable tissue, and a sprinkling of *Cyclidia* and free and attached *Pleuromonads*. A solitary circular encysted cell, and one specimen of a short-stemmed, minute, irritable *Vorticella*, were the only other bodies detected.

Cyclidium.

42. *Water from a well in the centre of the town.*—"This water is so brackish as to be unfit for use as drinking water." It was transparent, colourless, with a mere trace of sediment, but of a faint brackish taste. On microscopic examination, the sediment was found to consist in greater part of earthy and sandy particles, with a few fragments of vegetable tissues. In the neighbourhood of the latter there were a few specimens of *Cyclidium.*

Entomostraca.
Clathrocystis.
Amœba.
Bacterium.

43. *Water from a well in Kristnaraj Mohalla, on the south side of the town.*— This water is used for drinking. It was transparent, odourless, of a slight greenish tinge, and with little sediment, but contained a considerable number of small green masses and particles suspended in it, and tending to form a layer on the surface. The most characteristic feature in it was the abundance of *Entomostraca* present. Three different species were present in considerable numbers—*1st*, the common *Cyclops-quadricornis*; *2nd*, a species of *Daphnia*; *3rd*, a very peculiar ostracode form not met with in any other water here, nor in any of those examined in other places. The green masses were found to be composed of similar elements to those forming the like bodies in the water from the tank at Toomcoor. *Amœboid* cells were, however, present in greater abundance in this case.

Clathrocystis.
Amœba.
Bacterium.
Coleps.
Scenedesmus.
Pediastrum.
Trachelocerca.

44. *Water from the tank on the summit of Charmandi Hill.*—This water was turbid, due to the presence of many minute greenish suspended particles, and deposited a considerable amount of sediment of similar colour. The greater portion of the suspended matter, as well as of the deposit, was found to consist of masses of cellules, seemingly identical with those of the *Clathrocystis* found at Madras, Toomcoor, &c. As usual, there were associated with these cellules numerous sluggish *Amœbæ* of various sizes, and provided with distinct rythmically contractile vesicles. There was also in some of the patches an abundant development of large, two or three jointed *Bacteria.* In addition to the above, there were a certain number of patches of disintegrating vegetable tissue, numerous large active specimens of *Coleps hirtus*? (Plate IX, fig. 119), a few small *Scenedesmi* and fronds of a minute cruciate *Pediastrum* (Plate IX, fig. 43), and one or two large active *Trachelocercæ* (Plate, IX fig. 120), one of which was observed to undergo a process of transverse division.

45. *Water from a well on Davaroy Mohalla, in the west side of the town.*—The water of this well is used for drinking purposes. The upper portion of this water was transparent, the lower turbid, due to the presence of fine suspended flocculi, and there was also a considerable amount of sediment composed of grey flocculent matter. On standing for some time, it acquired a strong smell of sulphuretted hydrogen, and a faint alkaline re-action, and afforded an example corroborative of the common belief of the natives of the town, that "the water from the wells is spoiled by keeping." The sediment was found to consist in greater part of brownish amorphous matter.

Beggiatoa.
Hydrodictyon.
Bacterium.
Lyngbya.

The most characteristic feature in it was the extreme abundance of delicate, colourless, or faintly greenish filaments of *Beggiatoa* (Plate IX, fig. 58). There were also a few fragments of *Hydrodictyon* (Plate, IX fig. 57), a sprinkling of *Diatoms* and minute *Monads*, and abundance of minute active *Bacteria* and darting molecules. One peculiar *Monad* with the anterior extremity clear and non-granular, and with a long somewhat rigid flagellum (Plate IX, fig. 76), and one green filament of *Lyngbya,* were also observed.

Diatoms.
Cyclops.
Pediastrum.
Vorticella.
Cyclidium.
Raphidium.
Merismopedia.

46. *Water from a well beyond municipal limits, on the low ground on the eastern side of the town.*—This well is largely employed as a source of drinking water. The water was clear, transparent and odourless, with a considerable amount of sediment. A few specimens of *Cyclops* were swimming actively about in it. The sediment was composed mainly of particles of sand, and of amorphous, brownish, granular flakes. It contained numerous fronds of a large species of *Pediastrum,* subsequently found at Tanjore, a few small *Vorticellæ,* and long slender *Diatoms,* and the remains of a peculiar form of *Entomostraca.* There were also a few *Cyclidia,* one or two colourless specimens of what appeared to be a species of *Raphidium,* and some large plates of bluish-green *Merismopedium* (Plate IX, fig. 62).

Pleuromonas.
Paramecium.
Anthophysa.

47. *Water from the large tank within the small Fort, Tanjore.* This water was very turbid, and of a red colour. Even after standing for 24 hours, the turbidity appeared to be undiminished, and a mere trace of sediment was deposited, in the form of a few isolated particles. These particles, on microscopic examination, were found to consist of small, rough, apparently lateritious masses, while the fluid contained an abundance of molecules and smaller masses apparently of a similar nature. One or two molecular brownish flakes were present, in the neighbourhood of which there were a few free and attached specimens of *Pleuromonas,* one small *Paramecium,* and a small patch of *Anthophysa.*

48. *Water from a tank in the Fort of Tanjore.*—This water is, in the opinion of the natives, of very bad quality; although derived from the tank in the small fort by means of a channel, the water in this tank is not of a red colour. The specimen was clear, colourless and odourless, with hardly any sediment, but contained numerous small, green, floating masses, and showed a considerable number of active entomostracous crustacea towards the bottom. The green masses consisted of aggregations of cellules (*Clathrocystis*), previously observed in tank waters in Madras, Toomcoor, &c. In association with the cellules there were, as usual, numerous small *Amœbæ* with contractile vesicles, and a sprinkling of large, motionless *Bacteria*. The crustaceans were apparently specimens of a large species of the family *Daphniadæ*. The valves of the carapace were not reticulated.

Entomostraca.
Clathrocystis.
Amœba.
Bacterium.

49. *Water from Iyan Colum tank, Tanjore.*—This water agreed in general characters with No. 45, but contained less green floating matter, and a much greater abundance of *Crustacea*, and deposited rather more sediment of a greyish colour. The *Crustacea* were identical in nature with those of No. 45.

The sediment was composed of grey, molecular flakes, with fragments of laterite, cotton fibres, &c. Swimming with an active rotating movement through the fluid were numerous specimens of a brownish green species of *Peridinium* (Plate IX, fig. 110) with a distinct nucleus and flagellum. (The commonest form of *Peridinium* in Calcutta is shown in fig. 111.) There were also a few small active *Scenedesmi*, and one specimen of a *Vorticella*, with a very thick stem, a marvellously distinct stem-muscle, and two separate heads.*

Entomostraca.
Peridinium.
Scenedesmus.
Vorticella.

50. *Water from a well in the jail, Tanjore.*—This water is considered to be of very good quality, and is used as drinking water in the jail.

It was colourless, transparent and odourless, with very little sediment, but contained an abundance of minute, grey, suspended flocculi. These flocculi, as their appearance suggested, were in greater part composed of masses of *Anthophysa* stems and fine molecular matter. Entangled amongst these stems were numerous cotton fibres and particles of laterite. Swimming freely in the fluid were numerous heads and detached monads of *Anthophysa*, abundant specimens of the common *Coleps*, a few *Cyclidia* and small specimens of *Actinophrys*, and some *Amœbæ* with distinct contractile vesicles (Plate IX, fig. 93).

Anthophysa.
Amœba.
Actinophrys.
Coleps.
Cyclidia.

51. *Water from the Fort ditch, Tanjore.*—This was transparent, of a yellowish colour; it deposited a considerable amount of brownish sediment, and contained numerous small green masses, suspended in it, or floating on the surface. There were also numerous active *Crustacea* swimming freely about in it. The green masses were composed of the common cellules. The sediment, in greater part, consisted of brownish molecular matter, with a sprinkling of minute *Bacteria*, and in some places contained numerous active filaments resembling *Spirilla*, but showing no articulations. There were also numerous peculiar *Amœbæ* with delicate pointed extensions proceeding from their pseudopodal protrusions, abundant specimens of a bright green, red-stigmaed *Crumenula* (Plate IX, fig. 89), numerous active specimens of *Coleps*, and a sprinkling of *Scenedesmi*, and of large fronds of a species of *Pediastrum*, (Plate IX, fig 44). In addition to the above, there were also numerous small disciform diatoms, a sprinkling of minute specimens of *Actinophrys*, and a few monads and specimens of *Aspidisca*, one small very active *Vorticella*, and one specimen of a peculiar *Staurastrum*. The *Crustacea* consisted of a few specimens of *Cyclops* and numerous specimens of the large smooth *Daphnia* of Nos. 46 and 45, as well as of a smaller reticulated form.

Entomostraca.
Clathrocystis.
Bacterium.
Spirilla.
Amœba.
Crumenula.
Coleps.
Scenedismus.
Pediastrum.
Actinophrys.
Monads.
Aspidisca.
Vorticella.
Staurastrum.

52. *Water from drainage channel, Trichinopoly.*—This water was turbid, of a yellowish colour, and urinous aspect. It was perfectly odourless, deposited a considerable amount of brownish sediment, and contained numerous active mosquito larvæ. The sediment was found to be principally composed of stems of *Anthophysa*. Everywhere were myriads of active *Monads*, the majority of considerable size and circular form (Plate IX, fig. 71), a few minute and oval (Plate IX, fig. 73); the greater number free, a few attached posteriorly by a delicate thread. There were also numerous free *Pleuromonads*, and long delicate filaments of colourless *Beggiatoa*, with abundance of minute *Bacteria* and energetic molecular matter. Flakes of brownish molecular matter were also present in considerable numbers, with a few *Diatoms* and active *Cyclidia*.

Anthophysa.
Monads.
Pleuromonas.
Beggiatoa.
Bacterium.
Diatoms.
Cyclidia.

53. *Water from the Tanjore tank, Trichinopoly.*—This water is employed as drinking water. The upper portion of the specimen was quite clear, the lower slightly turbid. It deposited a slight buff-coloured sediment. The flakes of the sediment were principally composed of portions of disintegrating vegetable tissues entangled in a luxuriant growth of *Anthophysa* stems, bearing an abundance of attached heads. Detached heads and free monads swarmed in the surrounding fluid, which contained much active molecular matter.

Anthophysa.

54. *Water from well at Artillery cook-house, used as drinking water by the Artillery.*—This water was colourless, transparent, and odourless, with a mere trace of sediment in the shape of one or two detached particles. Microscopic examination showed very little. There was a sprinkling of what seemed to be cells of squamous epithelium, one or two small fragments of vegetable cellular tissue, and a few minute *Oscillariæ* and fungal filaments. These, with some lateritious particles, one or two minute active *Monads*, and a few good sized

Fungi.
Oscillaria.
Monads.

circular, encysted cells, were all the structures detected. There was hardly any free molecular matter present in it.

55. *River water from the Cauvery, Trichinopoly.*—The specimen was taken at the ghât on the Sreerungum side of the bridge. It was of a faint yellowish colour, depositing a considerable amount of brownish sediment, and containing numerous fine suspended particles, which rendered it slightly turbid. The sediment consisted almost entirely of angular fragments of sand and flakes of amorphous, brownish, granular matter. Here and there were globular masses of minute colourless or pale-greenish cellules. There were also present a sprinkling of diatoms of various species, a few small *Pediastra* (Plate IX, fig. 42), plates of *Merismopedia*, small active *Monads*, large colourless *Astasiæ* (Plate IX, fig. 82), small slender tank-worms (Plate IX, fig. 125), and active specimens of *Colepa*.

Merismopedia.
Pediastrum.
Astasia.
Monads.
Coleps.
Tank-worms.

56. *Water from the well used by the Infantry, Trichinopoly.*—This water was transparent, colourless, and odourless, with no sediment save a few minute separate particles. The fragments of sediment were composed of disintegrating vegetable tissues, with a few very delicate filaments of *Leptothrix*. In the neighbourhood of these fragments there was a sprinkling of delicate cells (Plate IX, fig. 67), apparently a species of *Glœocystis*, containing three or four minute green cellules. The fluid otherwise was extremely pure and free from molecular matter.

Leptothrix.
Glœocystis.

57. *Water from a well in Poothoor, Trichinopoly, used by the 26th Regiment Native Infantry.*—This water was colourless, transparent, odourless, with a few filmy, green suspended flocculi, but very little sediment, in the form of a few scattered, brownish particles. The filmy, green flocculi were composed of filaments of a *Confervaceous Alga*, seemingly a *Rhizoclonium*. Among the filaments there were a few specimens of various forms of infusoria. Among the most characteristic of these were a large species of *Actinophrys* and small, bright-green *spirilloid* filaments (Plate IX, fig. 49). There were also a few small discoid *Diatoms*, and a sprinkling of active *Monads*. The fragments of sediment were composed of disintegrating vegetable tissues, with angular particles of sand and the common amorphous, brown molecular matter. In their neighbourhood, and attached to them, were numerous specimens of the green *spirilloid* filaments and delicate colourless threads of *Leptothrix*.

Rhizoclonium.
Actinophrys.
Spirilla.
Diatoms.
Monads.
Leptothrix.

58. *Water from the well situated between the Artillery hospital and barracks, Trichinopoly.*—This water was perfectly clear, colourless and odourless, with no visible sediment, or suspended matters. Microscopic examination afforded hardly any results. A few small fragments of laterite, and one or two small portions of disintegrating vegetable tissue, in the neighbourhood of which there were some small colourless encysted cellules, were all that could be found.

Encysted cells.

59. *Water from a well in William's Road, Trichinopoly.*—This water was perfectly transparent, colourless and odourless, but deposited a slight sediment of buff-coloured particles. The sediment was found to consist in greater part of a dense network of pale green filaments of *Hypheothrix* (Plate IX, fig. 51), among the meshes of which angular particles of sand, fragments of laterite, and amorphous, brownish, granular matter were entangled. There were also a few short filaments of the common *Lyngbya*, one or two specimens of *Vaginicola*-like bodies without any lorica, a sprinkling of *Monads* and small *Heteromitæ*, and some active specimens of *Amphileptus*, one of which was observed to undergo transverse fission.

Hypheothrix.
Lyngbya.
Monads.
Vaginicola?
Heteromita.
Amphileptus.

60. *Water from Teppa Colum tank, Trichinopoly.*—This water is not used as drinking water. It was of a dirty yellowish colour, with numerous suspended and floating masses of a green colour, and a considerable amount of buff-coloured sediment. The green patches were found to be composed of the usual *Clathrocystis* cellules, and the associated *Amœbæ* and *Bacteria*. The sediment showed an abundance of cotton fibres, with much brownish granular matter, delicate colourless filaments of *Beggiatoa*, and a few *Anthophysa* stems. In some places there were small molecular flakes full of *Amœbæ* and minute encysted cellules, and here and there were shells or integuments furnished with various horn-like processes, and probably belonging to some species of *Peridinium*. There were also numerous delicate oval, hyaline, tuberculated capsules, showing a distinct ring-like mark towards one extremity and resembling ova in appearance; they were however uniformly empty. In addition to the above, there were numerous specimens of a large *Paramecium* distinctly visible to the naked eye, and containing yellow globules and two to three stellate contractile vesicles (Plate IX, fig. 131); an abundance of active specimens of *Coleps*, *Cyclidia*, and *Amœbæ* of various sizes, and small specimens of *Actinophrys* and active *Bacteria*; one or two specimens of *Chilodon*, some small *Scenedesmi*, and a few common tank-worms and fragments of the shells of *Cyclops*.

Clathrocystis.
Amœba.
Bacterium.
Beggiatoa.
Anthophysa.
Peridinium.
Paramecium.
Coleps.
Cyclidium.
Chilodon.
Actinophrys.
Scenedesmus.
Cyclops.

61. *Water from Saiyan tank, Trichinopoly.*—This water was clear, odourless, of a faint, yellow tinge, and deposited a considerable amount of sediment. The sediment consisted mainly of brownish granular flakes, with a little sand and some delicate septate mycelial filaments. In some places the flakes contained numerous encysted circular cells of various sizes. The surrounding fluid contained much free molecular matter; a sprinkling of minute darting *Monads*, numerous specimens of *Actinophrys* and *Amœbæ* of various sizes; a considerable number of *Amphilepti*

Fungal filaments.
Encysted cells.
Actinophrys.
Amœba.
Amphileptus.
Stylonychia.
Coleps.
Cyclidia.
Vorticella.
Vaginicola.

and small *Stylonychiæ;* a few common tank-worms; one or two specimens of *Coleps* and some *Cyclidia;* a single specimen of a very large *Stylonychia* (Plate IX, fig. 128); one small *Vorticella* and a few of the bodies, observed in No. 56, resembling *Vaginicola*, but not provided with loricæ.

62. *Water from Thalavoy tank, Trichinopoly.*—This water is used as drinking water. It was turbid, of a faint yellowish colour, and deposited much brownish sediment. On standing for some days, it acquired a decided odour of sulphuretted hydrogen. The sediment consisted in greater part of enormous numbers of fine colourless, or very faintly green filaments of *Beggiatoa*, with abundant active *Bacteria*, *Pleuromonads* and *Cyclidia* of various sizes. There were also a few small specimens of *Actinophrys*, one small *Paramecium*, and a few active specimens of *Coleps*. Entangled among the algoid filaments in one place was a solitary head of a fungus showing the characteristic structure of the common brown mould occurring in Calcutta (Plate VII, fig. 2 B).

Beggiatoa.
Bacterium.
Pleuromonas.
Cyclidium.
Actinophrys.
Paramecium.
Coleps.

63. *Water from Kotwal Choultry tank, Trichinopoly.*—This water is used as drinking water. It was clear, odourless, of a faint yellow colour, and deposited an abundant buff-coloured sediment. The sediment was almost entirely composed of amorphous granular matter. No special form of infusoria was very abundant, but there was a considerable variety of them present. Those observed were as follows: 1*st*, *Anthophysa* in small amount; 2*nd*, *Pediastra*, two species (Plate IX, figs. 42, 44); 3*rd*, *Scenedesmus;* 4*th*, *Cyclidium;* 5*th*, *Diatoms* of various forms; 6*th*, small groups of green cellules, each cellule provided with a delicate, colourless process (Plate IX, fig. 40); 7*th*, *Difflugiæ* like those of Madras (Plate IX, fig. 101); 8*th*, large colourless *Amœbæ;* 9*th*, *Trachelocercæ*, identical with those found at Mysore (Plate IX, fig. 120); 10*th*, long bluish-green spiral filaments of *Ophiocytium* (Plate IX, fig. 70); 11*th*, brown encysted circular cells; 12*th*, *Aspidiscæ*,—these perhaps the most abundant of all the forms present; 13*th*, active *Bacterium* and fine molecular matter.

Anthophysa.
Pediastrum.
Scenedesmus.
Diatoms.
Cyclidia.
Amœba.
Difflugia.
Trachelocerca.
Ophiocytium.
Aspidisca.
Bacterium.
Encysted cells.

64. *Water from Mr. Banbury's new tank, Trichinopoly.*—This water is used for washing, &c., but not as drinking water. It was of a greenish hue due to the presence of abundant green suspended particles, odourless, and deposited a mere trace of sediment in the form of a few brownish particles. The green matter consisted of the common cellules and their accompanying *Amœbæ* and *Bacteria*. The sediment was principally composed of brown, closely-jointed, fungoid filaments, and of the more or less disintegrated remains of masses of cellules similar to those suspended in the fluid. There were also a few discoid *Diatoms;* some detached *yeast* cells; a sprinkling of specimens of common *Actinophrys*, *Cyclidium* and *Amphileptus;* one or two very delicate filaments of *Beggiatoa;* some active specimens of *Cyclops*, and some portions of disintegrating vegetable tissues.

Clathrocystis.
Amœba.
Bacterium.
Diatoms.
Yeast cells.
Actinophrys.
Amphileptus.
Cyclidium.
Beggiatoa.
Cyclops.

65. *Water from the tank in the Rock Fort, Trichinopoly.*—This water is used as drinking water. It contained much floating and suspended green matter, and deposited a mere trace of sediment. The green matter was composed of the usual cellules of *Clathrocystis*, *Amœbæ* and *Bacteria*. The sediment was composed of isolated patches of brownish granular matter, and in the neighbourhood of some of these there were a few specimens of *Cyclidium*, *Chilodon* and *Stylonychia* (Plate IX, fig. 116). A few specimens of the small *Daphnia*, resembling *Daphnia pulex*, previously observed in waters in Mysore and Tanjore, were also present. Beyond the above structures the water showed hardly anything, and appeared to be on the whole very pure.

Clathrocystis.
Amœba.
Bacterium.
Cyclidium.
Chilodon.
Stylonychia.
Daphnia.

66. *Water from a well at Sreerungum, Trichinopoly.*—This water was colourless, odourless, transparent, and deposited a mere trace of sediment. The fragments of sediment were composed of portions of decomposing vegetable tissue, with the usual amorphous, brown, granular matter. In and around these flakes there were large numbers of active *Pleuromonads*, a scanty sprinkling of small *Amœbæ*, free and encysted, and a few large *Cyclidia*.

Amœba.
Cyclidium.
Pleuromonas.

67. *Water from the tank in the Fort ditch, Bellary.*—This water was clear, colourless and odourless, with a mere trace of sediment, and a sprinkling of active specimens of *Cyclops* swimming in it. Microscopic examination showed very little. What little sediment was present appeared to be composed almost entirely of grains of sand and other inorganic particles. Hardly a trace of animal or vegetable life was to be detected, beyond the *Entomostraca* previously alluded to, and a few minute *Monads*, solitary or in small groups.

Cyclops.
Monads.

68. *Water from the tank near the Traveller's Bungalow, Bellary.*—This water was of a yellowish colour, odourless, contained a considerable amount of fine suspended matter, and deposited a buff-coloured sediment. The sediment was found to be principally composed of brownish granular matter and angular crystalline particles. Nitric acid dissolved the greater part of the latter with violent effervescence. In addition to the above, there were numerous fragments of disintegrating vegetable tissues, cotton fibres and minute navicular *Diatoms*. There were also a few filaments of *Oscillaria* and *Lyngbya;* a few active *Vibriones* and *Bacteria;* numerous minute darting molecules; a sprinkling of small *Monads* and *Aspidiscæ*, and one or two small *tank-worms* of the common form.

Diatoms.
Oscillaria.
Lyngbya.
Vibriones.
Bacterium.
Monads.
Aspidisca.
Tank-worms.

69. *Water from the well in the lines of the Native Cavalry, Bellary.*—This is not used as drinking water. It was clear, odourless, of a faint yellowish tinge, and deposited a large quantity of pale

buff-coloured sediment on the sides and bottom of the vessel containing it. This deposit consisted mainly of brownish granular matter, with an abundance of crystalline particles similar to those of No. 68. Among the materials of the sediment there were numerous filaments of *Oscillaria* of various sizes. In the fluid there was a sprinkling of *Anthophysa* stems, and abundance of the free monads belonging to them, with numerous *Pleuromonads*, a great number of active *Bacteria*, and much fine molecular matter. One or two tank-worms, *Stylonychiæ*, and *Aspidiscæ*, were also present.

Oscillaria.
Anthophysa.
Pleuromonas.

Bacterium.
Stylonychia.
Aspidisca.

70. *Water from the well from which the men of the Native Cavalry obtain their drinking water, Bellary.*—The well is situated in the centre of an old grave-yard. This water was clear, colourless, odourless, and deposited a slight sediment of the common pale buff colour. The sediment was composed of brown granular matter, with an abundance of crystalline particles similar to those of Nos. 66, 67, and contained some portions of disintegrating vegetable tissues, cotton fibres, &c. There were few infusoria present. The only forms observed were a few filaments of *Lyngbya*, and one or two specimens of *Chilodon* and *Stylonychia*, and a scanty sprinkling of minute active *Monads*, *Vibriones* and *Bacteria*.

Monads.
Vibriones.
Bacterium.

Lyngbya.
Chilodon.
Stylonychia.

71. *Water from a well in the same grave-yard as No. 70 well.*—This water is only used for bathing and washing. It was of a pale greenish colour, slightly turbid, with an abundance of suspended particles and a scanty sediment. The sediment showed some of the usual amorphous matter and crystalline particles, with an abundance of active *bacteria* and darting molecules. There were also numerous delicate filaments of *Oscillaria* and *Lyngbya*; an abundance of *Amœbæ*, chiefly in the neighbourhood of disintegrating *Daphniæ*; one or two good-sized *Vorticellæ*, and a few specimens of the large *Paramecium*, previously found in water at Trichinopoly (Plate IX, fig. 131).

Bacterium.
Oscillaria.
Lyngbya.
Amœba.

Daphnia.
Vorticella.
Paramecium.

72. *Water from the well in the compound of the Civil Dispensary, Bruce Pettah, Bellary.*—This water is used for culinary purposes, but not for drinking. It was colourless, transparent and odourless, with a mere trace of sediment. The sediment presented the same general features as those of the other specimens of Bellary waters. There was little evidence of the presence of organic pollution, or of animal or vegetable life in it. A few specimens of *Amphileptus* and *Euplotes* (Plate IX, fig. 112) were seen. This water and that from the lake at Ootacamund were the only ones in which *Euplotes* was observed.

Amphileptus.

Euplotes.

73. *Water from the village well, Cottapully.*—This water was of a slight greenish-yellow colour and a faint soft smell, but deposited no sediment, and was quite transparent. Active specimens of *Cyclops* and of the large *Daphnia (?)*, previously observed in the water of the ditch at Tanjore, were abundant, with a few large *Rotiferæ*, and great numbers of large, slightly moving *Bacteria*, and still colourless cells, apparently *Raphidia*.

Entomostraca.
Rotiferæ.

Bacterium.
Raphidia.

NOTE

COMMON FORMS OF MICROSCOPIC FUNGI IN CALCUTTA, &c.

I.—COMMON FORMS IN CALCUTTA.

Fungi affecting rice.

1. As any fungi affecting rice have acquired special interest in connection with Professor Hallier's theory of the causation of cholera, it appears best to consider them in the first place.

Results of experiments on growing rice plants.

2. Cultivations corresponding to those described by Hallier in which growing rice was treated with choleraic materials have, in my hands, failed to develop any special fungi—any forms differing from those appearing in corrective cultivations in which normal dejecta were employed as manuring agents. Owing to the abnormal circumstances under which the plants were placed,—excluded as far as possible from external influences by being covered with bell glasses,—the growth in neither class of cultivations was healthy; for although the seeds germinated freely, and the young plants at first grew rapidly, yet this growth soon ceased, and they damped off without flowering. This was of the less moment, however, as the fungal development on which so much stress was laid in the German observations was one which affected the leaves, and not the grain, of the rice, and the cultivations afforded ample opportunities for the examination of the former.

The German rice-fungi did not appear.

3. Now, as regards them, it is certain that in no instance did any fungi similar to those appearing on the rice-leaves at Jena show themselves; in none did any fungal forms characteristic of the "cholera series" appear, and in none were they affected by any fungi which did not likewise occur on the leaves of the plants treated with the non-choleraic media. On the sickly and dead leaves fungal patches did frequently make their appearance, but these were composed of the mycelium and heads of a minute white *Aspergillus*, apparently merely an ill-developed variety of the common yellow species. Careful examinations of dried specimens of the stems, leaves, and husks of rice have given similar results; for although in many instances these were found to be more or less affected by mould, yet nothing resembling the fungus described and figured by Professor Hallier was to be found. The mould consisted simply of *Aspergillus*, similar to that on the leaves in the cultivation experiments, or in a few cases of common *Penicillium glaucum*.

Frequent occurrence of fungoid grains in the rice of the bazaars.

4. As regards the rice grains, however, there can be no doubt that in many samples of bazaar rice a certain number of them are more or less affected by a fungoid growth, which replaces the starch, and destroys the grain more or less. The degree of affection in the individual grains, and the total number affected in different samples, varies considerably. As a general rule, only a very few fungoid grains are present, but occasionally a sample is met with in which they form a characteristic feature, their presence being easily detected by their becoming of a brownish or black hue, the intensity of which is dependent on the amount of fungal cells present in each. The grains ultimately become somewhat shrunken and furrowed, hard and black, showing a deep black surface on section, but do not break up or show any superficial development of fungal cells in the form of mould. Thin sections show masses and chains of dark-brown fungal cells (Plate X, figs. 1, 2). The individual cells generally contained one or two distinct granules, and in some instances showed traces of transverse septation.

Results of the cultivation of such grains.

Peculiar form appearing in cultivations on glycerine and phosphate of ammonia.

5. Numerous cultivations of such grains were undertaken, but the results obtained were unsatisfactory and indefinite. Cultivations in which glycerine and phosphate of ammonia were employed as a medium generally afforded an abundant crop of the common yellow *Aspergillus* (Plate X, fig. 3 A). Occasionally, along with this, there was a certain amount of a large brown *Mucor* or *Ascophora*, which subsequently occurred in profusion in cultivations of damaged wheat flour (Plates X, fig. 3. B, XI, fig. 3). In one case, in addition to *Penicillium glaucum*, and the yellow and glaucous *Aspergilli*, there was a considerable development of a form which had not been previously observed (Plate X, fig. 4). The mycelium was colourless, jointed here and there, showing slight dilitations, and giving origin to numerous erect, jointed, brownish filaments. These filaments divided above into numerous branches spreading in a more or less umbellate fashion, occasionally giving origin to secondary branches, and bearing at their apices large, irregularly rounded bodies of a deep-brown colour, composed of several round or oval cells, closely aggregated, and in some cases, to all appearance, partially fused together (Plate X, fig. 4. C). These heads, when cultivated, gave origin to numerous closely-jointed brown filaments, forming dense networks and irregular cellular heaps (Plate X, fig. 6), closely resembling those originally present in the rice. There was, however, nothing to prove positively that they had any organic connection with the latter, and the only thing in favour of the supposition that they were so connected, was the fact that on the only occasion on which the form to which they belonged was observed, it was as a result of the cultivation of fungoid rice grains.

Peculiar form appearing in a cultivation on moist earth.

6. Considering that the natural locality for the further development of the fungal cells in the grain is in all probability the earth, an experiment was tried in which the affected grains were planted in moist earth. The result was an abundant development on some grains of the common *Aspergillus*, and on others of a form which had not been previously obtained during the course of the series of observations (Plate X, fig. 5). The mycelium was densely meshed among the starch grains of the rice, consisting of nearly colourless, jointless filaments, showing occasional dilatations, and arising from brownish cells seemingly identical with those (Plate X, fig. 1) originally present in the grain. Towards the outer surface of the grain, the mycelial filaments were long, with few joints or branches, and of a Vandyke-brown colour. These brown filaments gave origin to thick, erect, jointless threads, two or three frequently arising close together, clavate at their apices, and bearing an abundance of minute, colourless spores on a dense layer of spicules (Plate X, fig. 5). To the naked eye, and under low powers and reflected light, the heads were of a beautiful bright bluish-green tint when mature. Whether this or the previous form has any organic connection with the fungal cells of the rice is very doubtful, but the fact that such cells are not uncommon in the grain sold in the bazaar is certain.

Commonest mucedinous fungi in Calcutta.

7. The commonest mucedinous forms in Calcutta have been already described in connection with the subject of cultivations of choleraic media, and I shall here only mention one or two other species of microscopic fungi which appear to deserve notice on account of their prevalence.

Ascophora appearing on rice and wheat flour.

8. A species of *Mucor* or *Ascophora* has been already referred to as occasionally appearing in cultivations of rice grains. It was observed on other occasions on various media, but by far the finest and most abundant specimens were obtained in a series of cultivations of damaged wheat flour. The sample was a portion of a supply of Australian flour from which it was found impossible to make good bread, owing to its not "rising," and was sent down from the Darjeeling jail for examination, as in outward appearance there was nothing bad about it. Many specimens were examined, and all gave similar results, showing the presence of an abundance of minute branched fungal filaments. Cultivations of this flour invariably resulted in the rapid growth of these filaments, and the subsequent development from them of rich crops of a dark-brown *Mucor*. Comparative experiments were tried with samples of good flour, and although fungi ultimately appeared on them, there was not the immediate development characterising the damaged flour, and the forms developed were almost without exception those occurring with greatest profusion on any other decomposing substances. The mycelium of the *Mucor* formed a tangled mass of colourless, septate filaments, irregularly branched and showing numerous dilitations. From the mycelium, long, usually jointless filaments arose, which curved downwards and became rooted at their extremities in a stoloniferous* manner (Plate XI, fig. 3. B). At the rooted points they gave origin to two or three erect, amber-coloured threads, bearing dark, brown sporangia (Plate XI, fig. 3 B). Occasionally, in place of curving down and rooting, the elongated filaments divided directly into several sporangiferous branches (Plate XI, fig. 3. A). From the points where the stolons were rooted, a new series of filaments were given off, which curved down and rooted in their turn, and this process being repeated again and again, the fungus rapidly spread over a large circular area. The spores were large, fusiform, and, when mature, of a rich brown colour (Plate XI, fig. 3. D). The dehiscence of the peridiole was usually of the nature characterising *Ascophora*, consisting of a gradual disintegration and disappearance, followed by collapse of the columella (Plate XI, fig. 3. C), but occasionally it was of the character normal in *Mucor*.

Stoloniferous growth.

Aspergillus developed in water.

9. Of occasional occurrence in water, and even in specimens of what is supplied as distilled water, is a peculiar form of *Aspergillus* (Plate XI, fig. 1. A). It appears to the naked eye in the form of soft white floating masses, of a woolly aspect, and showing a sprinkling of fawn-coloured heads of spores. The mycelium is colourless and sparsely septate, the individual cells containing numerous oily-looking globules in their protoplasm. The filaments are irregularly branched and bear three distinct forms of fructification. These are,—1*st*, large solitary circular cells, each of which is situated at the apex of a side branch of the mycelium ; 2*nd*, isolated chains of small conidial cells ; 3*rd*, large *Aspergillus* heads (Plate XI, fig. 1. A). These are borne on thick jointless filaments, and are characterised by the extreme tenacity with which the individual spores of the chains adhere to one another. The spores are of small size (Plate XI, fig. 1), and, when in mass, of a pale fawn colour.

Three forms of fructification.

Fungus on mango leaves.

10. On the living leaves of ferns and of mango trees patches of an exceedingly pretty *Rhinotrichum* (?) are not uncommon (Plate XI, fig. 7). It appears usually in the form of circumscribed rusty yellow spots on the upper surfaces of the affected leaves. On microscopic examination these spots are found to be composed of clusters of thick, erect, jointed filaments, clavate at the apex, and full of masses of brilliant orange protoplasm. The clavate extremity gives origin to a few large spicules, each of which is surmounted by a solitary, obovate orange spore.*

Species of Stilbum.

11. Two species of *Stilbum* are of very frequent occurrence during the rains. The commonest is of bright orange colour, and occurs in profusion on the bark of dead bamboos. The second species is characterised by a black stem and salmon-coloured head, and is found on decaying bark.

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* The spores are at first concealed by a delicate colourless capsule, which is ruptured by their growth and by the lengthening of the upper part of the stem, and frequently remains in the form of a sheath or collar a little below the head.

Sphæriacei.

12. Various sphæriaceious species are very common, as, for instance, that affecting the leaves of bamboos, and one occurring indifferently on various kinds of dead wood (Plate XI, fig. 22. A, B). The perithecia are carbonaceous, erumpent, destitute of stroma and clothed with projecting filaments. (A. Detached and ruptured perithecium). They contain numerous, very delicate asci, containing six or eight brown fusiform spores (B).

Sphæronemei.

13. A species of sphæronemeious fungus is occasionally to be met with in abundance on damp paper. It consists of small, free, carbonaceous perithecia, which are provided superiorly with numerous long filaments (Plate XI, fig. 8). The perithecia ultimately rupture at the apex and allow numerous brown spores to escape, which, remaining entangled among the filaments, form large projecting masses (Plate XI, fig. 8. B).

Æcidium.

14. A species of *Æcidium* is not uncommon at certain seasons on the leaves of various shrubs. It appears on the under surface of the leaves of the lowest branches, in the form of bright-yellow irregular patches. Those patches are formed of circular, occasionally confluent, cups, with toothed, incurved margins, and containing an abundance of large obovate, minutely echinulate, yellow spores (Plate XI, fig. 16. A, B).

II.—COMMON FORMS OF MICRO-FUNGI IN THE NEILGHERRIES.

Common micro-fungi of the Neilgherries.

15. The profusion of microscopic fungi occurring on the plateau and slopes of the Neilgherries is very great, and their "germs" must frequently be present in the air in large numbers. The most conspicuous species are those affecting living leaves, which specially abound in the damper parts of the ghâts, some of them producing conspicuous spots and patches on the leaves, and others covering them almost entirely with a dense black felty coating.

Penicillium.

16. A small species of *Penicillium*, apparently a variety of the common *Penicillium glaucum*, is very abundant, occurring on decaying fruit, &c. (Plate XI, fig, 6). The species of *Aspergillus*, so abundant in Calcutta, do not appear to be of frequent occurrence.

Mucor.

17. A small species of *Mucor* is common on various decaying substances (Plate XI, fig. 5). The mycelium is composed of colourless, sparsely-jointed filaments, giving origin to an abundance of erect, jointless fertile threads bearing globose sporangia, which are at first colourless, and ultimately deep black. The spores are eliptic and of a brown colour (Plate XI, fig. 5. B).

Eurotium.

18. As previously mentioned, the yellow *Eurotium* occurring in Calcutta was also obtained in abundance at Ootacamund, growing on decaying garden seeds.

Rhinotrichum ?

19. The *Rhinotrichum* (?) of the mango leaves in Calcutta is here found in abundance on various evergreen leaves, and specially on those of the common rhododendron.

Dematiei.

20. Species of dematieous genera abound, frequently clothing the living leaves of evergreen trees and shrubs with dense black webs of filaments.

Cladosporium.

Three forms of spores.

21. One of the most abundant of these appears to be a species of *Cladosporium* (Plate XI, fig. 19). It covers the affected leaves with a sooty, easily detached felt, and produces three different kinds of spores (Plate XI, fig. 19 A, D, E). Those of the first form (A) are of an elongated fusiform shape, and marked by three or four septa. They arise here and there from the sides of erect, jointed brown filaments. Those of the next form (E) are much larger, rounded at their extremities, and showing four septa. They are found on the network from which the erect filaments arise. Those of the third form are very minute, oval and colourless (D). They are contained within large, globular carbonaceous perithecia (B), which are found in the same situation as the second variety of spores. These are reticulated like the perithecia of *Eurotium* (C), but apparently differ from them in containing naked spores and no asci.

22. A large, handsome *Helminthosporium* occurs abundantly on dead bark (Plate XI, fig, 18).

Sphæronemei.

23. Various species of *Sphæronemei* occur, which produce the same effect as the *Cladosporia* in blackening the leaves of various plants.

Fungus on leaves of coffee plants.

24. One of the most interesting of these is one which is associated with the "coffee bug," and which is commonly supposed by the planters to be a secretion from the insect. It occurs as a dense sooty-black web, covering the surfaces of the leaves, and easily peeled off in flakes from them, leaving the substance of the leaf apparently intact. It usually is confined to the superior surfaces of the leaves, and only affects the inferior surfaces, on which the insect is chiefly found to a very limited extent. In certain instances in which the surfaces of the leaves have been accidentally reversed during their growth, and in which the inferior surfaces are presented to the light, I have observed that the distribution of the insect and fungus is also reversed, the former affecting the true superior surface, and the latter the true inferior one. The planters give different and somewhat conflicting accounts regarding the relative times of development of the insect and the fungal growths, some asserting that they are first made aware of the presence of "the bug" by the blackening of the plants, due to the development of the fungus; while others say that they think the appearance of the fungus is a good sign, and shows that the

Connection between the occurrence of insect and fungal affections of the leaves of the coffee plant.

plants will soon be free of the disease. The relation between the occurrence of the insect and the fungus is somewhat obscure, and would require careful investigation to determine; but in the meantime it is certain that they do constantly co-exist, and that, as a rule, they affect the opposite surfaces of the diseased leaves.* When examined microscopically, the black web is found to be composed of a dense cellular layer covered with elongated, carbonaceous perithecia (Plate XI, fig. 20. A). These are clothed with numerous short cellular processes below, and end superiorly in an elongated slender neck, with a slightly expanded ostiolum, surrounded with somewhat re-curved tooth-like processes (Plate XI, fig. 20. B), and giving exit to innumerable minute, oval, colourless spores (Plate XI, fig. 20. B).

Puccinia.

Coleosporium.

Æcidium.

25. Other coniomycetous species occur in great abundance on different herbaceous plants. Among the commonest of these are a large *Puccinia* occurring on the under surfaces of the leaves of a common small climber (Plate XI, fig. 9), a *Coleosporium* (Plate XI, fig. 11), very frequent on the under surface of the leaves of *Tradescantia*, which it covers with dusty ochrey rings and patches; and a second species on Barberry leaves, with brilliant yellow oval spores (Plate XI, fig. 12) in pustules on red discoloured patches. Two species of *Æcidium* are also of common occurrence, the first (Plate XI, fig. 14) on the leaves of *Gnaphalium*, the second on those of *Strobilanthes* (Plate XI, fig. 15).

Fungus affecting cinchona leaves.

26. On the under surfaces of various leaves, among which are those of *Cinchona succirubra*, patches of bright canary-yellow, echinulate spores are sometimes to be found (Plate XI, fig. 10), mingled with which are a few much larger, elliptical, ribbed ones.

Sphæriacei.

27. Various species of sphæriaceious fungi are also very abundant, both on living and dead vegetable tissues, some of the aggregate forms producing very conspicuous effects on the colouring of the plants which they affect. Among the commoner of these are the following:—1*st*, one commonly occurring on dead bark in the ghâts. It appears in the form of prominent black specks, composed of isolated, erumpent perithecia without any stroma. The asci (Plate XI, fig. 21) are elongated, slender, surrounded by delicate paraphyses, and containing six to eight oval spores, which in most cases, when mature, are uniseptate, and give origin in germinating to a delicate terminal mycelial thread from either extremity. 2*nd*, one forming small flattened black warts on the superior surfaces of evergreen leaves in the ghâts. These warts are formed of isolated perithecia, widely opened and destitute of stroma, and are very conspicuous, due to their intense black colour and to the narrow ring of yellow discoloured leaf tissue which encircles them. The asci (Plate XI, fig. 23) are large, obovate, and surrounded by thick paraphyses. They contain numerous large spores, with an hour-glass contraction in the centre dividing them into two lobes, each of which contains a large globular mass of protoplasm, but which are not separated from one another by any kind of septum. 3*rd*, a species forming large, slightly prominent yellow patches on the leaves of evergreen trees and shrubs in the ghâts. The leaf is discoloured throughout its whole thickness, and on the inferior surface shows depressions corresponding with the prominences of the other side. The spots on transverse section are found to be composed of aggregations of immersed circular perithecia filled with long, slender, blunt-tipped asci, generally containing eight oval spores (Plate XI, fig. 26). 4*th*, a species appearing in black rough patches on the upper surfaces of the leaves of a labiate plant at Ootacamund. The patches are composed of minute globular perithecia of an intense black colour, erumpent, without stroma, opening by a pore at the apex, and occasionally confluent. The asci are short, obovate, and filled with brown spores (Plate XI, fig. 24. A, B), each of which contains a couple of prominent globules. 5*th*, a species forming black elevated patches and crusts on the surface of the leaves of shrubs on the hills around Ootacamund. These crusts consist of radiating occasionally confluent circular patches of black stroma, bearing towards their centre several prominent globular perithecia, surrounded by radiating, occasionally branched, black filaments. The perithecia contain somewhat elongated asci, surrounded with very large paraphyses (Plate XI, fig. 25). The thecæ are extremely delicate and contain two large brown spores, which are subdivided into five distinct portions by four transverse septa, and contain numerous oily-looking globules in their interior.

28. The above are a few of the commoner microscopic fungi of the ghâts and plateau of the Neilgherries, such as are easily attainable in a cursory examination, and produce conspicuous effects on the higher vegetation of the localities in which they occur.

III.—FORMS OF MICROSCOPIC FUNGI COMMON IN TANJORE.

Common forms of micro-fungi in Tanjore.

29. Owing to the fact that the time spent in Tanjore was very short, and that it was mainly occupied in examinations connected with the soil theory and the microscopic characters of the water-supply, only a few species of fungi, very conspicuous from their appearance and from the effects which they produced, were obtained.

Fungoid rice.

Ascophora.

30. Those of commonest occurrence were the following:—1*st*, some of the samples of rice obtained from the bazaar contained a few specimens of the blackened fungoid grains previously described as occurring in the rice of the bazaars of Calcutta. 2*nd*, a very large, handsome, dark-brown *Ascophora* occurred in great profusion on young jack-fruits in the public garden within the small fort, covering them

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* It is highly probable that this question has been already worked out, but as I have been unable to meet with any notice of it in Calcutta, it appeared to be desirable to record any information regarding a matter of so great practical importance.

Ravenelia ?

with a deep-brown or black felt of fertile heads, and causing them to leave a sooty stain on anything with which they came in contact. The fertile filaments were erect, jointless, occasionally branched, and of a brownish colour (Plate XI, fig. 17. A). The majority of the spores were globular and very dark-brown (Plate XI, fig. 17. B), but among these there were a few very large, colourless, oval, uniseptate bodies. *3rd*, covering the leaves and shoots of shrubs (*Phyllanthus*) in the same garden was an exceedingly beautiful and peculiar form of fungus, which I have as yet been unable to identify, but which agrees in the outward characters of its heads with those of *Ravenelia*, as figured by Mr. Berkeley. It occurred in the form of circular, flattened, sessile, areolate discs, surrounded by a row of short capitate rays (Plate XI, fig. 13. A), appearing in profile concavo-convex (Plate XI, fig. 13. B), and attached to the leaves, &c., on which they grew by means of short, delicate, root-like filaments. The discs were formed of an aggregation of cells (Plate XI, fig. 13. C) of a more or less cuneate form, surmounted by a wart-like prominence, and containing a large circular or oval nucleoid body in their interior. Their structure was complex, as they contained two distinct masses of protoplasm, the lower and larger of which was colourless, or pale yellow, and contained the nucleus, while the upper was of a rich reddish-brown colour, and appeared to be composed of numerous separate layers (Plate XI, fig. 13. C). The peripheral rays were colourless and attached to the outer row of cells (Plate XI, fig. 13. C), in which the coloured layer was curved round so as to reach the lower surface of the disc. In association with the discs were numerous, delicate, colourless, spore-like cells (Plate XI, fig. 13. D), but the exact method of their attachment could not be made out, owing to the fact that they were invariably separated in the process of examination. The discs when mature were of a beautiful, glistening, rich brown colour, and were very easily detached from the leaves, &c., by a little friction or by the application of moisture.

Presence of fungi in the air of various localities.

31. Examinations regarding the presence and amount of fungoid cells in the air were made in various localities in the south of India. Owing to the want of proper apparatus, these could only be roughly performed by means of examination of the dust which had settled on the ledges on doors and other parts of buildings, and on the leaves of trees growing near the sides of roads. These examinations, owing to their imperfection, as well as to their very limited number, yielded little in the way of positive results, beyond the fact that the dust in certain very feverish localities, such as Mysore and Teppakairdah, did not appear to contain any greater abundance of fungoid cells than that of other localities, such as Tanjore, which are very free from fever. In both sets of localities some specimens contained a very large number of such cells, while others showed hardly any. Whether the cells present were of a different nature in the different localities could not be ascertained, owing to the want of time and facilities for careful examination.

Results of examinations of fungi.

32. The entire series of examinations of fungi has as yet altogether failed to discover any evidences of the association of any peculiar fungoid growth with the occurrence of cholera, but the questions involved in a really satisfactory determination of the matter are so complex and so beset with fallacies that any statements regarding them must necessarily be merely provisional, until a very much larger number of examinations and experiments has been made.

NOTE C.

DEVELOPMENTS OCCURRING IN SOLUTIONS OF CHOLERAIC MATERIALS.

Experiments on cholerized solutions.

1. Very many experiments were tried on this point, but, as previously recorded, without any remarkable results being obtained. The details of one such experiment are recorded in connection with the question of the existence of an organic relation between certain *Amœbæ* and *Monads*.

Formation of "proligerous pellicle."

2. The primary development in all such experiments consisted in the formation of a surface layer of *Bacteria* and *Vibriones*, with a varying amount of structureless gelatinous material. Subsequently various higher infusorial forms appeared, the relative proportions of which varied greatly in different instances. As previously mentioned, fungal cells were very rare, but low algoid forms frequently appeared at late periods in the course of experiments.

Amœbæ and monads most frequent.

3. The forms of infusoria of most frequent occurrence were certainly the *Amœbæ* and *Monads*, previously alluded to (Plate V, figs. 3, 4). *Anthophysa* (Plate V, fig. 1) came next in order of frequency, sometimes prevailing to the almost entire exclusion of other forms. *Cyclidium* and *Chilodon* (Plate V, fig. 2) frequently made their appearance at a later period. Of less frequent occurrence were *Pleuromonas*, *Amphileptus*, and minute *Monads*, characterised by being provided with a distinct contractile vesicle (Plate V, fig. 6, A, B, C), while in a limited number of instances there was a development of numerous specimens of small species of *Actinophrys*, *Astasia*, and *Diselmis* (Plate V, fig. 6, D, E, F).

No infusoria peculiar to choleraic solutions.

4. None of these infusoria were peculiar to choleraic solutions or occurred in greater numbers in them than in solutions of blood-serum and of various other organic materials.

EXPLANATION OF THE PLATES.

PLATE I.

Fig. 1.—Diagram illustrative of the questions regarding wells as indices of conditions of soil-moisture.
A.—Surface well.
B.—Well sunk into the impermeable sub-soil, but dependent on local soil-water.
C.—Well opening into a body of water beneath the first impermeable stratum.
D.—Accumulation of soil-water in a shallow depression.

Fig. 2.—Diagram illustrative of the influence of bunded tanks on the conditions of soil-moisture in the neighbourhood.
A.—Area in which there is accumulation of soil-moisture.
B.—Tank causing the accumulation in the soil of A.

Fig. 3.—Diagram illustrative of the existence of local accumulations of soil-moisture beneath an evenly sloping surface.

PLATE II.

Fig. 1.—**A.**—Large cells resembling exudation cells, and amœbæ from a choleraic dejection, × 330.
B.—Small Amœbæ from a choleraic dejection, × 330.

Fig. 2.—Epithelial cells from a choleraic dejection, × 330 & 700.

Fig. 3.—**A.**—Blood-corpuscles from a choleraic dejection, × 330.
B.—Greenish cells from a choleraic dejection, × 330.
C.—White blood-corpuscles from a dysenteric dejection, × 330.
D.—Cells from a dysenteric dejection treated with acetic acid, × 330.
E.—Red blood-corpuscles after 24 hours' immersion in choleraic fluid, × 330.

Fig. 4.—Miscellaneous objects from choleraic dejecta.
A.—Dhâl cells, × 103.
B.—Sarcina, × 330.
C.—Starch-corpuscles, × 330.
D.—Peculiar cells resembling cysts, × 330.
E.—Remains of vegetable tissue, × 330.
F.—Dhâl cells from a dhâl grain, × 103.

Fig. 5.—Miscellaneous objects from choleraic dejecta.
A. **B.**—Ova of entozoa, A × 210, B × 330.
C.—Pediastrum, × 330.
D. Desmids and other algal cells, × 330.

Fig. 6.—Miscellaneous objects from choleraic dejecta.
A.—Crystals of ammonio-phosphate of magnesia, × 330.
B.—Crystals of greenish color, × 330.
C.—Bacteria, × 330.

PLATE III.

Fig. 1.—Portion of a choleraic dejection.

Fig. 2.—Epithelium and red blood-corpuscles from the contents of the ileum of the same case.

Fig. 3.—Summit of a villus with epithelial cells and delicate vesicles from the jejunum of a case of cholera.

Fig. 4.—Epithelium from the jejunum of a case of cholera.

Fig. 5.—Cells from a choleraic dejection.

Fig. 6.—**A.**—Cells resembling exudation cells from a choleraic dejection.
B.—Exudation cells from the serum of a blister treated with acetic acid.

PLATE IV.

Fig. 1.—Cercomonads from choleraic dejecta.
A.—Commoner variety, × 330.
B.—2nd variety, × 330.

Fig. 2.—Rarer form of monad from choleraic dejecta, × 330.

Fig. 3.—Portion of a choleraic dejection, × 330.

Fig. 4.—Cells from a choleraic dejection, × 330.

Fig. 5.—Changes of form in Amœbæ of a choleraic dejection, × 330.

Fig. 6.—Changes of Amœbæ in breaking up, × 330.

PLATE V.

INFUSORIA FROM SOLUTIONS OF CHOLERAIC DEJECTA.

Fig. 1.—Anthophysa from a solution of choleraic dejecta.

Fig. 2.—Infusoria from solutions of choleraic dejecta. (Cyclidium and Chilodon).

Fig. 3.—First appearance of amœbæ in a cholerized solution.

Fig. 4.—Active and encysted amœbæ and the monads developed from them.

Fig. 5.—Cells developed in a choleraic dejection.

Fig. 6.—Infusoria commonly found in cholerized solutions.
A.—Pleuromonas.
B.—Amphileptus. (?)
C.—Minute monads with contractile vesicles.
D.—Actinophrys.
E.—Astasia.
F.—Diselmis. (?)

PLATE VI.

Fig. 1.—**A**—Encysted and still cells from non-choleraic dejecta.
B.—Amœbæ from non-choleraic dejecta.

Fig. 2.—Cells due to the gemmative multiplication of amœbæ in a non-choleraic dejection.
Fig. 3.—More advanced stage of the same process in the same dejection.
Fig. 4.—Similar cells developed in another dejection.
Fig. 5.—Similar cells developed in another dejection.
Fig. 6.—Cells occurring in a dejection produced by sulphate of magnesia.
A.—Cells resembling the macroconidia of Professor Hallier.

PLATE VII.

Fig. 1.—**A**.—Large brown aspergillus. (?)
B.—Small neutral aspergillus.
Fig. 2.—**A**.—Structure of the head and spores of the common yellow Aspergillus.
B.—Structure of the head and spores of the large brown Aspergillus. (?)
Fig. 3.—**A**.—Structure of the head and spores of the common green Aspergillus. (A. glaucus).
B.—Structure of the head and spores of the small neutral Aspergillus.
Fig. 4.—Penicillium from a cultivation of choleraic material.
Fig. 5.—Cystoid bodies on the mycelium of Aspergillus.
Fig. 6.—Germination of one of these with the development of penicillioid heads from the resulting mycelium.

PLATE VIII.

Fig. 1.—Small fungal cells from a diarrhœal dejection.
A.—Free.
B.—In the flocculi.
Fig. 2.—Development of yeast-cells from these.
Fig. 3.—Oidium filaments and cells from a diarrhœal dejection.
Fig. 4.—Yeast-cells from diarrhœal dejecta.
Fig. 5.—Fungi appearing in cultivations of non-choleraic dejecta.
A.—Aspergillus glaucus.
B.—Dactylium. (?)
Fig. 6.—**A**.—Dactylium filaments and spores.
B.—Bacteria in a non-choleraic dejection free and included in oily matter.

PLATE IX.

Fig. 1.—Cosmarium, × 330.
Fig. 2.— " "
Fig. 3.— " "
Fig. 4.— " "
Fig. 5.— " "
Fig. 6.— " "
Fig. 7.— " "
Fig. 8.— " "
Fig. 9.—Scenedesmus, "
Fig. 10.—Cosmarium, "
Fig. 11.— " "
Fig. 12.— " "
Fig. 13.— " "
Fig. 14.—Pediastrum Tetras, × 330.
Fig. 15.—Staurastrum, "
Fig. 16.—Scenedesmus, "
Fig. 17.—Micrasterias, "
Fig. 18.—Cosmarium, "
Fig. 19.——————(?) "
Fig. 20.—Scenedesmus "
Fig. 21.— " "
Fig. 22.— " "
Fig. 23.—Staurastrum, "
Fig. 24.— " "
Fig. 25.— " "
Fig. 26.— " "
Fig. 27.—Euastrum, "
Fig. 28.—Cosmarium, "
Fig. 29.—Closterium, "
Fig. 30.— " "
Fig. 31.—Ankistrodesmus, "
Fig. 32.— " "
Fig. 33.—Closterium, "
Fig. 34.—Spondylosium, (?) "
Fig. 35.—Docidium, × 165.
Fig. 36.—Gonatozygon (?), × 330.
Fig. 37.—Hormiscia (?). "
Fig. 38.—Propagula of Coleochaete (?), × 330.
Fig. 39.—Closterium, "
Fig. 40.—Propagula of Coleochaete, "
Fig. 41.—Pediastrum, "
Fig. 42.— " "
Fig. 43.— " "
Fig. 44.— " "
Fig. 45.— " "
Fig. 46.—Chlamydomonas, "
Fig. 47.———— (?) "
Fig. 48.—Clathrocystis (?), × 700.
Fig. 49.—Sperulina, × 330.

Fig. 50.—Beggiatoa, × 700.
Fig. 51.—Hypheothrix, × 330.
Fig. 52.—Oscillaria, × 700.
Fig. 53.—Cœlastrum (?), × 330.
Fig. 54.—Oscillaria, ,,
Fig. 55.—Lyngbya, × 330.
Fig. 56.————(?), ,,
Fig. 57.—Hydrodictyon, ,,
Fig. 58.—Beggiatoa, × 700.
Fig. 59.—Ophiocytium, × 700.
Fig. 60.—Anabaina, ,,
Fig. 61.—Lyngbya, ,,
Fig. 62.—Merismopedia, ,,
Fig. 63.— ,, ,,
Fig. 64.—Botryococcus (?) ,,
Fig. 65.————(?) ,,
Fig. 66.—Glœococcus, ,,
Fig. 67.—Glœocystis, ,,
Fig. 68.—Gonium, ,,
Fig. 69.—Pandorina, ,,
Fig. 70.—Ophiocytium, ,,
Fig. 71.— ,, ,,
Fig. 72.— ,, ,,
Fig. 73.— ,, ,,
Fig. 74.— ,, ,,
Fig. 75.—Heteromita, ,,
Fig. 76.—Monas, ,,
Fig. 77.— ,, ,,
Fig. 78.— ,, ,,
Fig. 79.— ,, ,,
Fig. 80.— ,, ,,
Fig. 81.—Heteromita, ,,
Fig. 82.—Astasia, ,,
Fig. 83.—Colacium (?), ,,
Fig. 84.————(?), ,,
Fig. 85.————(?), ,,
Fig. 86.—Phacus, ,,
Fig. 87.— ,, ,,
Fig. 88.—Euglena viridis, ,,
Fig. 89.—Crumenula, ,,
Fig. 90.—Euglena, × 330.
Fig. 91.—Euglena (spirogyra ?), × 330.
Fig. 92.—Dinobryon, × 330.
Fig. 93.—Amœba, ,,
Fig. 94.— ,, ,,
Fig. 95.— ,, ,,
Fig. 96.— ,, ,,
Fig. 97.— ,, ,,
Fig. 98.— ,, ,,
Fig. 99.— ,, ,,
Fig. 100.—Difflugia, ,,
Fig. 101.— ,, ,,
Fig. 102.— ,, ,,
Fig. 103.—Arcella, ,,
Fig. 104.—Actinophrys, × 700.
Fig. 105— ,, × 330.
Fig. 106.— ,, ,,
Fig. 107.— ,, ,,
Fig. 108.— ,, ,,
Fig. 109.— ,, ,,
Fig. 110.—Peridinium, ,,
Fig. 111.— ,, ,,
Fig. 112.—Euplotes, × 165.
Fig. 113.—Bursaria (?), ,,
Fig. 114.————(?), × 330.
Fig. 115.—Chilodon, ,,
Fig. 116.—Stylonychia, ,,
Fig. 117.—Amphileptus (?), ,,
Fig. 118.—Stylonychia, ,,
Fig. 119.—Coleps, × 350.
Fig. 120.—Trachelocerca, × 330.
Fig. 121.—Cyclidium, ,,
Fig. 122.—Aspidisca, ,,
Fig. 123.————(?), ,,
Fig. 124.—Holophrya (?), × 52.
Fig. 125.—Tankworm, × 330.
Fig. 126.—Spirostomum, × 103.
Fig. 127.—Vaginicola, × 330.
Fig. 128.—Stylonychia, ,,
Fig. 129.————(?), ,,
Fig. 130.—Stentor, × 165.
Fig. 131.—Paramecium, ,,
Fig. 132.—Zoothamnium, × 103.
Fig. 133.—Cyclidium, × 330.

N. B.—Figs. 30, 32, 45, 60, 68, 102, and 111 are from Calcutta specimens.

PLATE X.

FUNGI AFFECTING RICE.

- *Fig.* 1.—**Fungal cells in a blackened rice-grain, × 330.**
- *Fig.* 2.—**Similar cells in another grain, × 330.**
- *Fig.* 3.—**A.**—Yellow Aspergillus.
  - **B.**—Ascophora developed in a cultivation of blackened rice.
- *Fig.* 4.—Mould which appeared in another similar cultivation.
  - **A.**—Mycelium, fertile filaments and spores, × 103.
  - **B. C.**—Fertile filament and spores, × 330.
- *Fig.* 5.—Mould which appeared in a cultivation of blackened grains on moist earth.
  - **A.**—Erect, fertile filaments and heads, × 41.
  - **B.**—Structure of a head, × 103.
  - **C.**—Spores, × 330.
- *Fig.* 6.—Cells developed on the germination of spores of the mould of Fig. 4.

PLATE XI.

FUNGI.

- *Fig.* 1.—Aspergillus developed in water.
  - **A.**—Head, stem and portion of mycelium, × 103.
  - **B.**—Spores, × 330.
- *Fig.* 2.—Penicillium glaucum.
  - **A.**—Mycelium and erect fertile filaments, × 330.
  - **B.**—Spores, × 330.
- *Fig.* 3.—Ascophora.
  - **A.**—Branched, fertile filament, × 41.
  - **B.**—Stoloniferous filament, × 103.
  - **C.**—Head with collapsed columella, × 330.
  - **D.**—Spores, × 330.
- *Fig.* 4.—Eurotium.
  - **A.**—Perithecia and mycelium, × 103.
  - **B.**—Portion of a perithecium, × 330.
  - **C.**—Thecae and spores, × 330.
- *Fig.* 5.—Mucor common on the Neilgherries.
  - **A.**—Fertile filament and head, × 103.
  - **B.**—Ruptured capsule and spores, × 330.
  - **C.**—Mycelial filament and young head, × 330.
- *Fig.* 6.—Penicillium glaucum from the Neilgherries, × 330.
- *Fig.* 7.—Rhinotrichum (?), × 1[illegible].
- *Fig.* 8.—Sphaeronemeious fungus, common in Calcutta.
  - **A.**—Perithecium and spores, × 103.
  - **B.**—Portion of a filament and spores, × 330.
- *Fig.* 9.—Puccinia, common in the Neilgherries, × 330.
- *Fig.* 10.—Yellow echinulate spores, occurring on the leaves of Cinchona, &c., × 330.
- *Fig.* 11.—Coleosporium of the common tradescantia of the Neilgherries, × 330.
- *Fig.* 12.—Coleosporium of the Barberry. Neilgherries, × 330.
- *Fig.* 13.—Fungus affecting the leaves, shoots, and fruit of Phyllanthus.
  - **A.**—One of the cellular discs, × 103.
  - **B.**—Profile view of the same, „
  - **C.**—Detached cells, × 330.
  - **D.**—Spores (?), „
- *Fig.* 14.—Æcidium of Gnaphalium, Neilgherries.
  - **A.**—Peridium, × 26.
  - **B.**—Cells of peridium, × 330.
  - **C.**—Spores, × 330.
- *Fig.* 15.—Æcidium of strobilanthes, Neilgherries.
  - **A.**—Peridium and spores, × 41.
  - **B.**—Cells of peridium, × 330.
  - **C.**—Spores, × 330.
- *Fig.* 16.—Æcidium (?) occurring on leaves in Calcutta.
  - **B.**—Peridium, × 103.
  - **A.**—Spores, × 330.
- *Fig.* 17.—Mucor (Ascophora), common in Tanjore.
  - **A.**—Fertile filaments, columellae and spores, × 103.
  - **B.**—Spores, × 330.
- *Fig.* 18.—Helminthosporium, common on dead bark, Neilgherries, × 330.
- *Fig.* 19.—Cladosporium, common on living leaves, Neilgherries.
  - **A.**—Jointed filaments and spores, × 330.
  - **B.**—Eurotial perithecium, × 103.
  - **C.**—Portion of a perithecium showing reticulate structure, × 330.
  - **D.**—Spores contained in the perithecia, × 330.
  - **E.**—Large septate spores, × 330.
  - **F.**—Common spore germinating, × 330.
- *Fig.* 20.—Fungus affecting the coffee-plant.
  - **A.**—Perithecia, × 65.
  - **B.**—Upper extremity of a perithecium discharging spores, × 330.
- *Fig.* 21.—Sphæriaceious fungus from living leaves, Neilgherries, ascus and spores, × 330.
- *Fig.* 22.—Sphæriaceious fungus occurring on dead wood, Calcutta.
  - **A.**—Perithecium, × 103.
  - **B.**—Ascus and spores, × 330.
- *Fig.* 23.—Sphæriaceious fungus from living leaves, Neilgherries, ascus and spores, × 330.
- *Fig.* 24.—Sphæriaceious fungus from the living leaves of a labiate plant, Neilgherries, ascus and spores, × 330.
- *Fig.* 25.—Sphærinceious fungus from living leaves, Neilgherries, ascus and spores, × 330.
- *Fig.* 26.—Sphæriaceious fungus from living leaves, Neilgherries, ascus and spores, × 330.

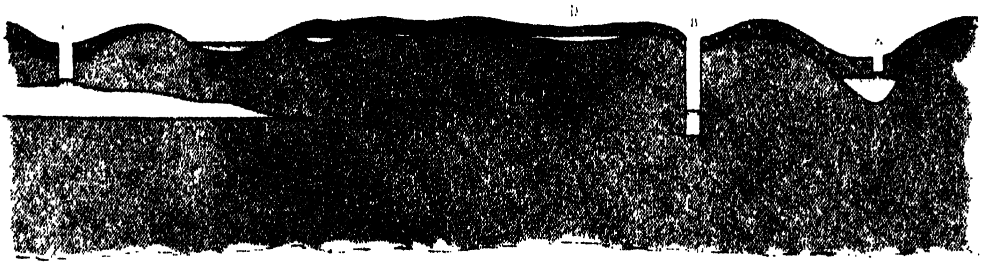
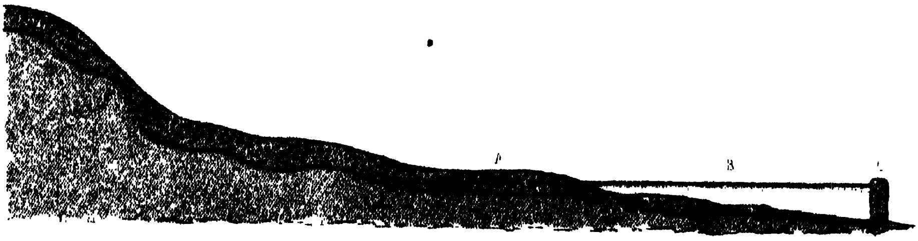


FIG I



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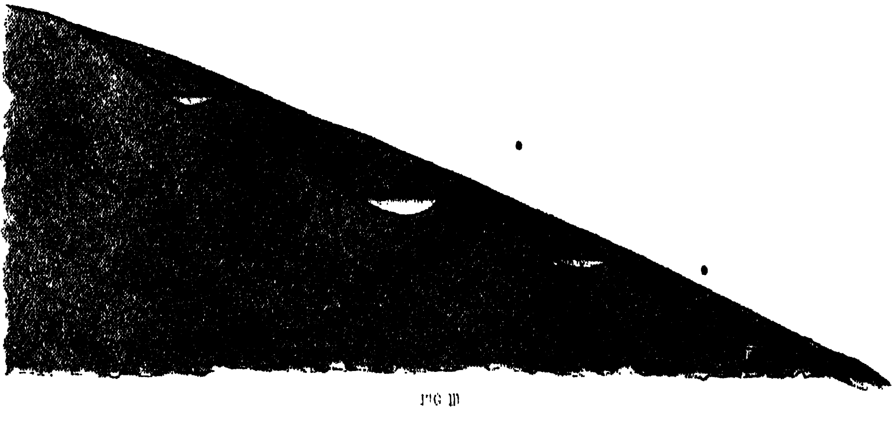

FIG III

FIG. I

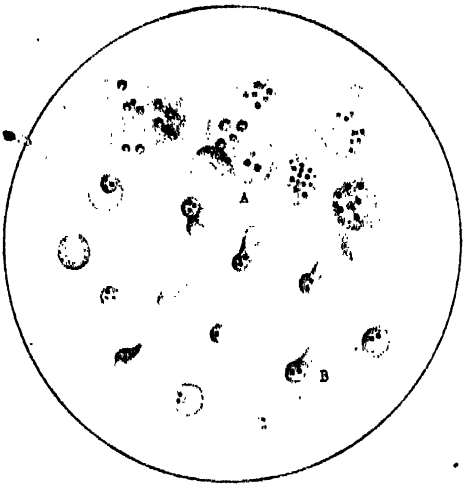

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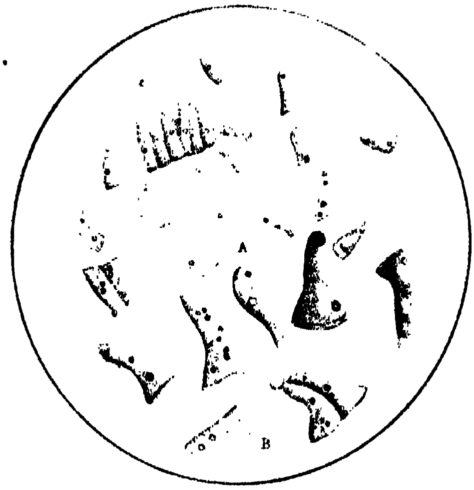
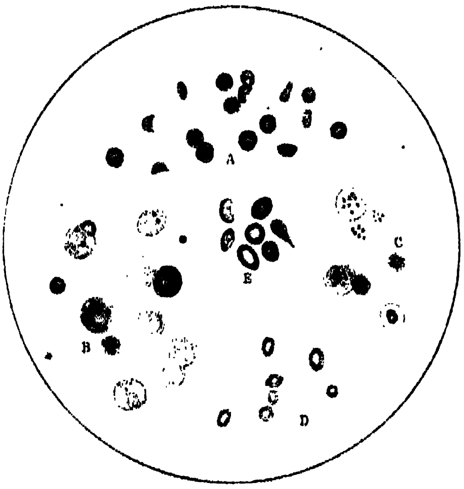
FIG. II



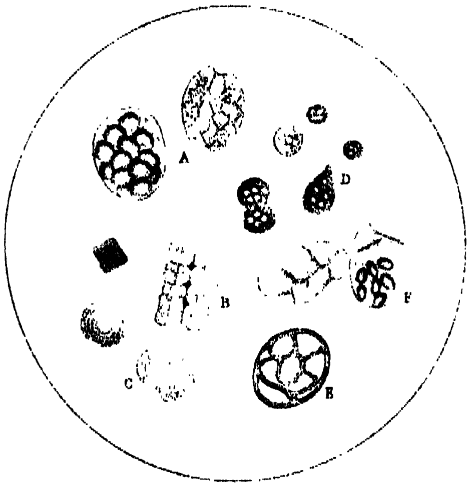
A × 330
B × 700

FIG. III



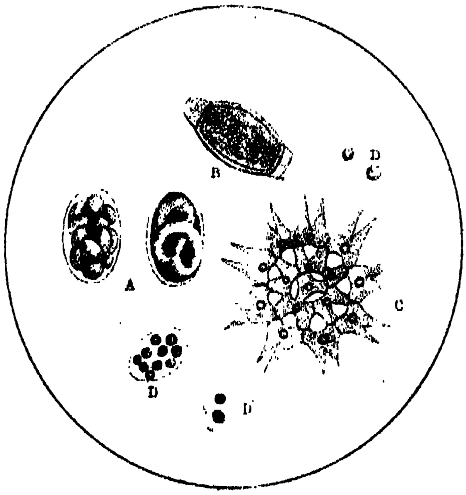
× 330

FIG. IV



A F × 103
B C D E × 330

FIG. V



A × 210
B C D × 330

FIG. VI

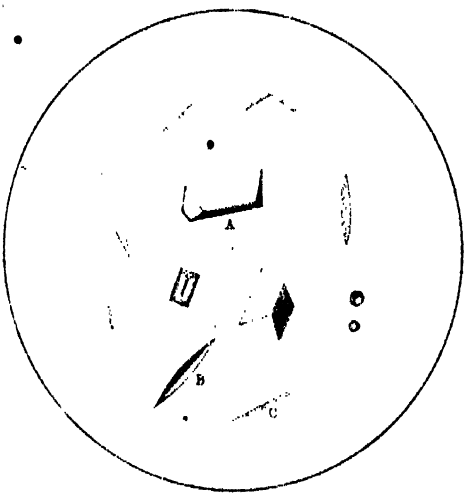


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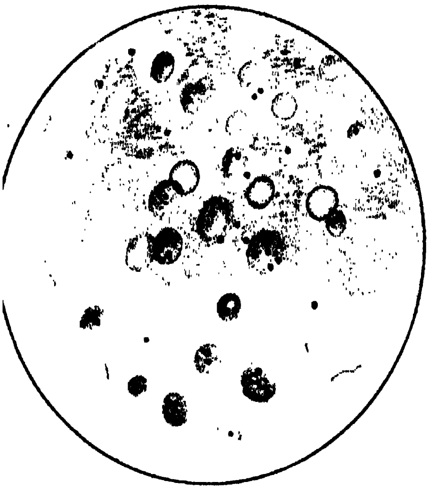
FIG I.



× 330

FIG II

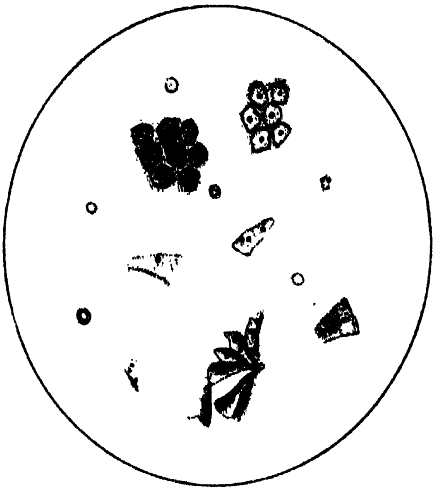


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FIG III

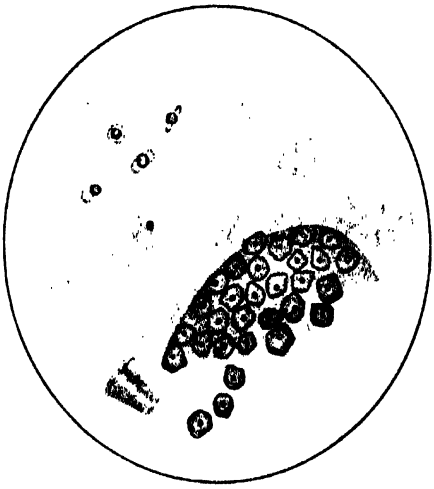

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FIG IV

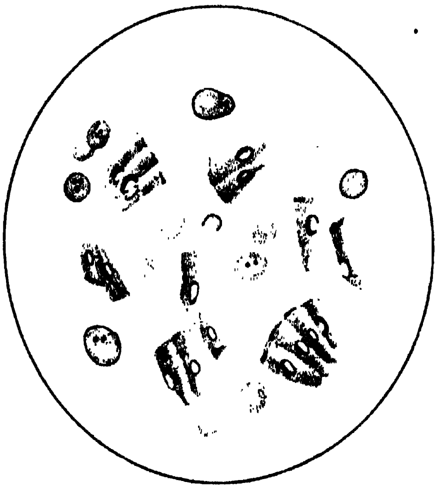

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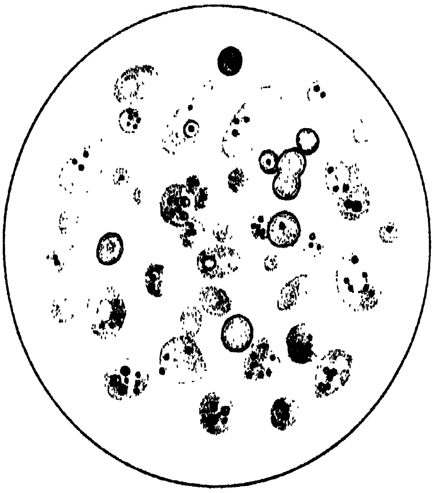
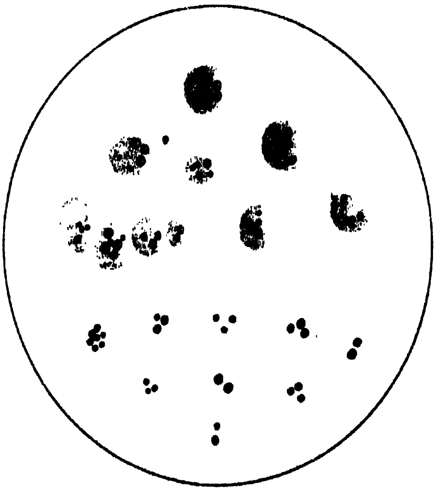
FIG V



× 330

FIG VI



× 330

Engraved by C W Guard at the Surveyor Generals Office

FIG I

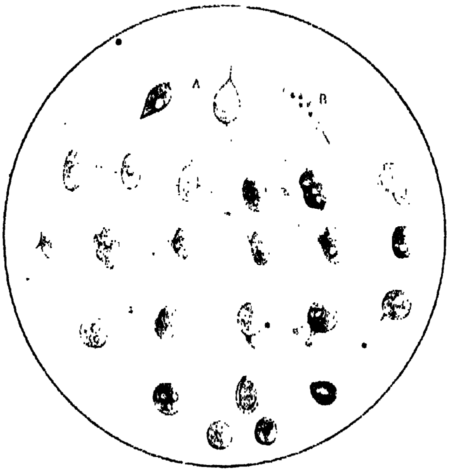


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FIG II

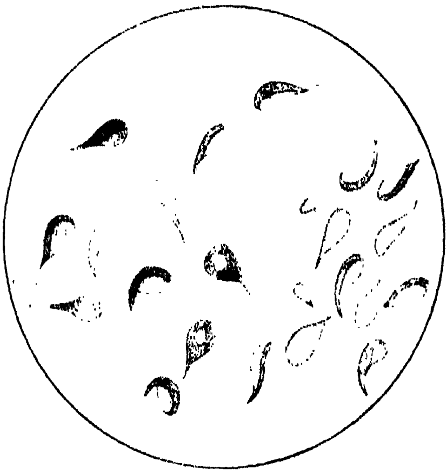

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FIG III

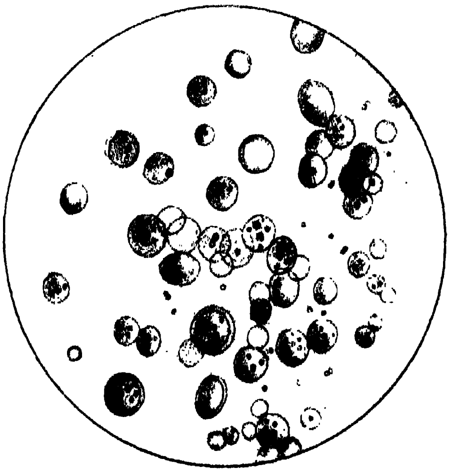

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FIG IV

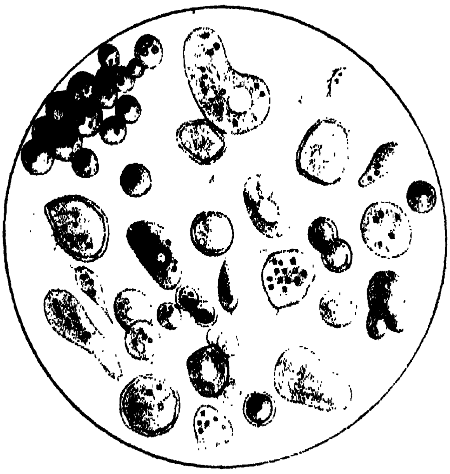

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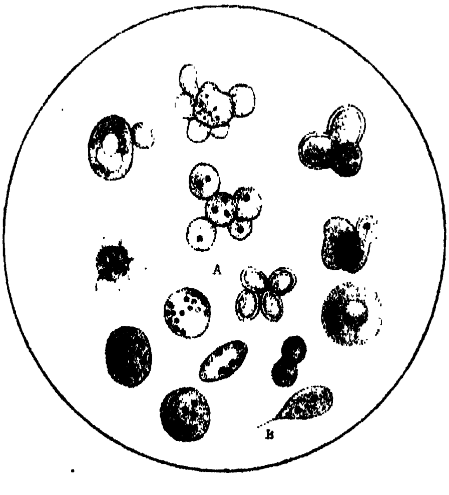
FIG V



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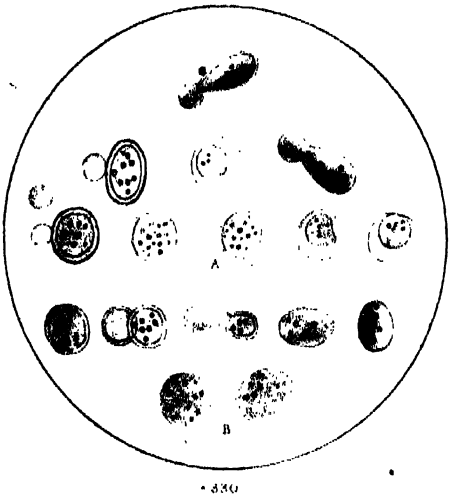

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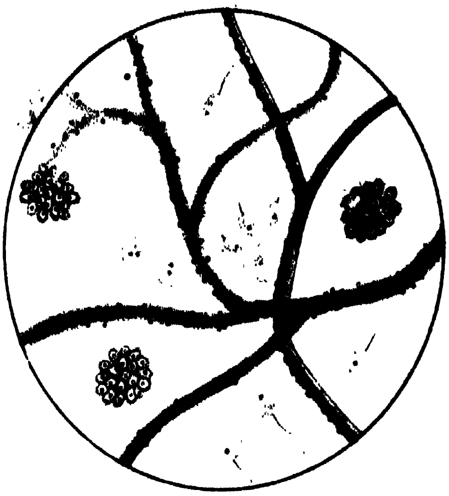
FIG I



× 330

FIG II

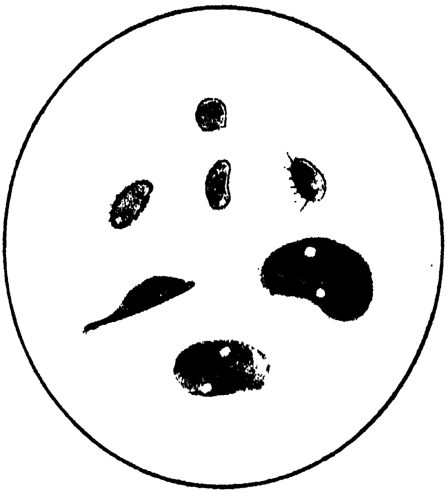


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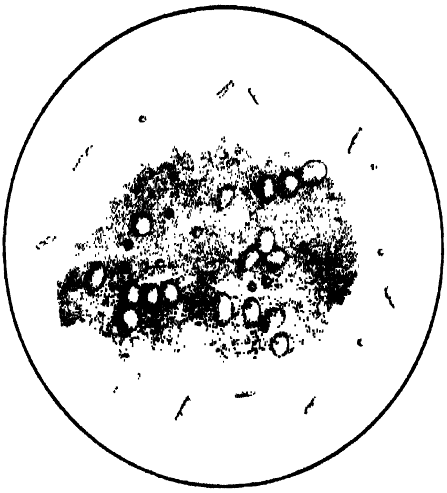
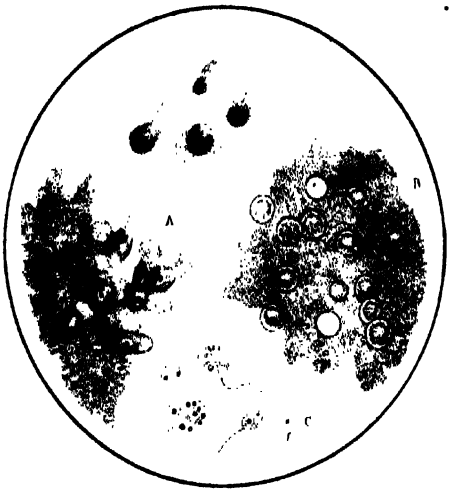
FIG III



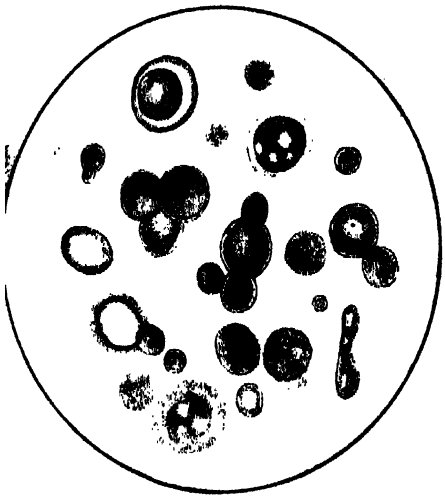
× 1000

FIG IV



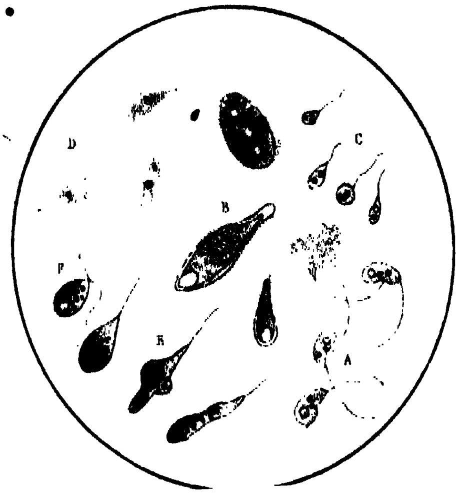
× 330

FIG V



× 330

FIG VI



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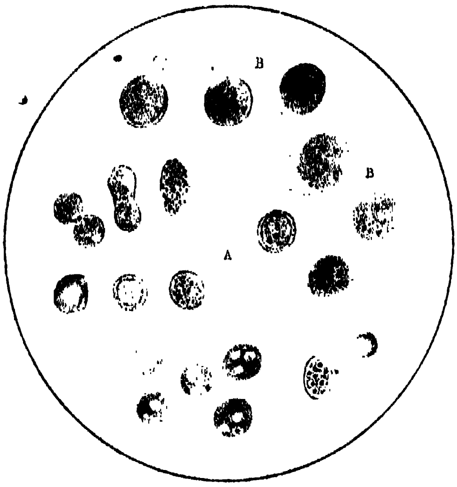

× 330

FIG II

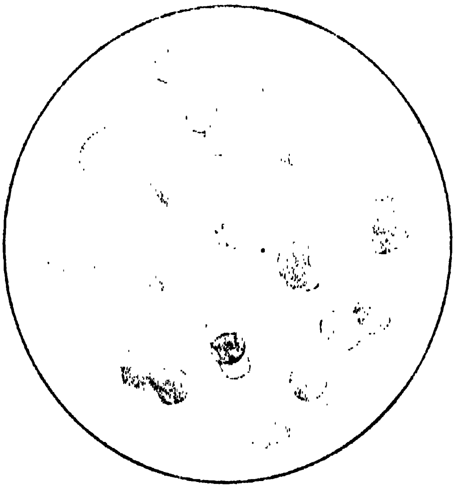

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FIG III

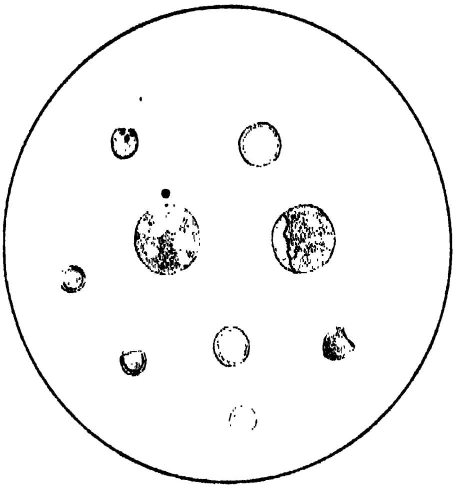

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FIG IV

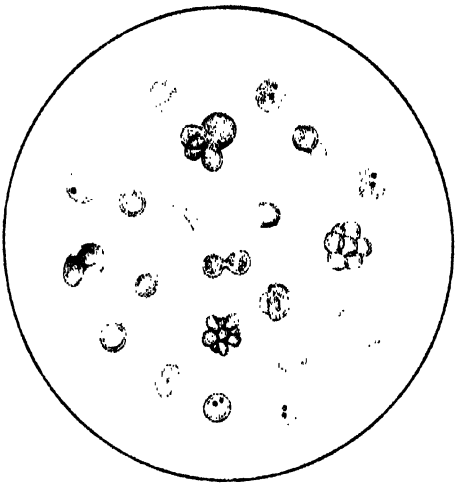

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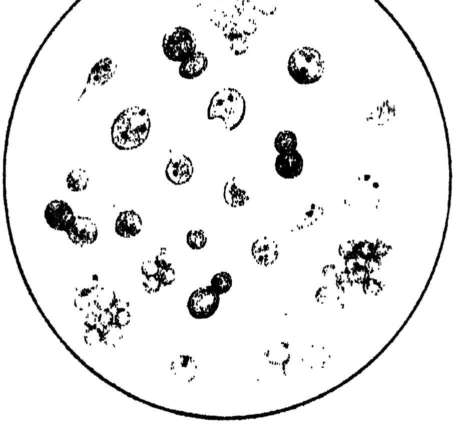
FIG V



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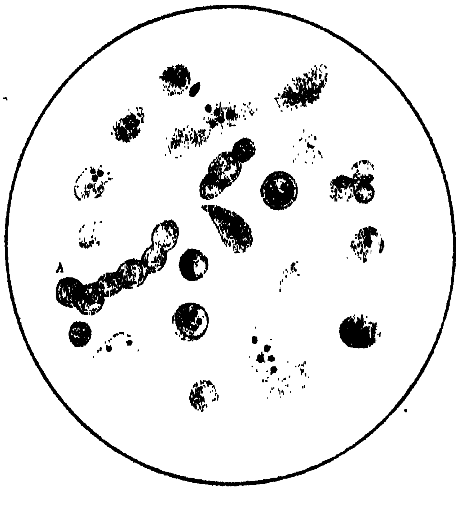

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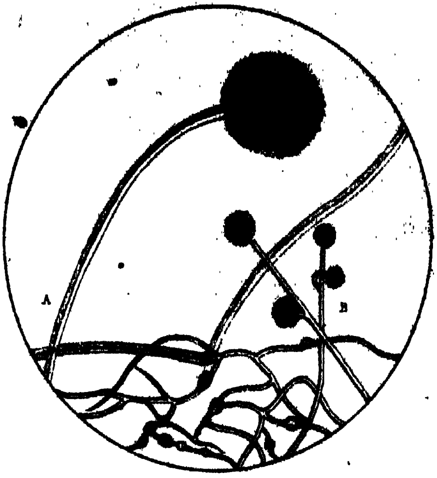

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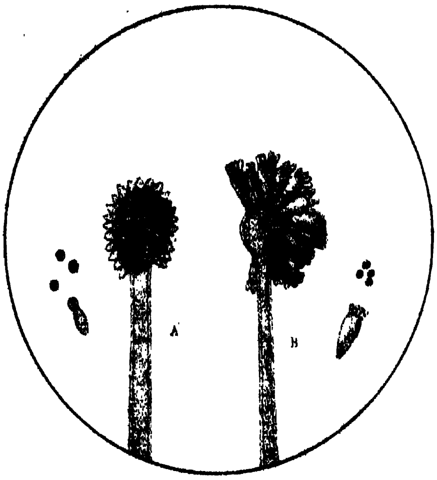
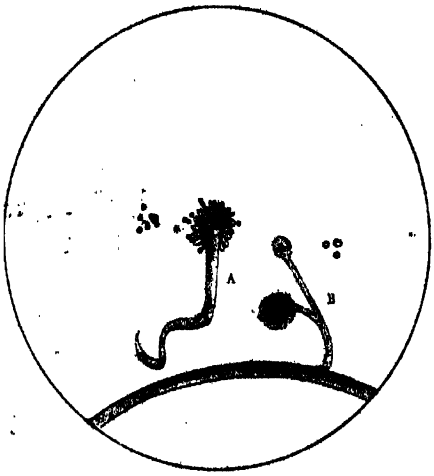
FIG. II.



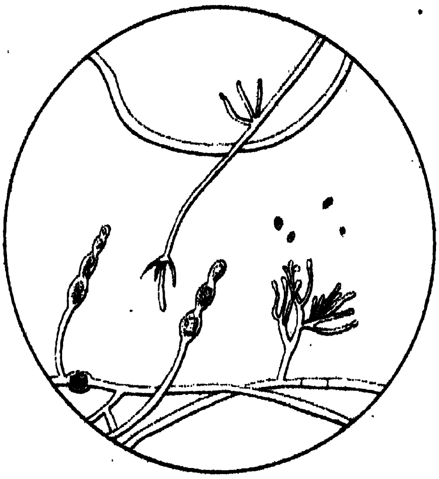
× 330

FIG. III.



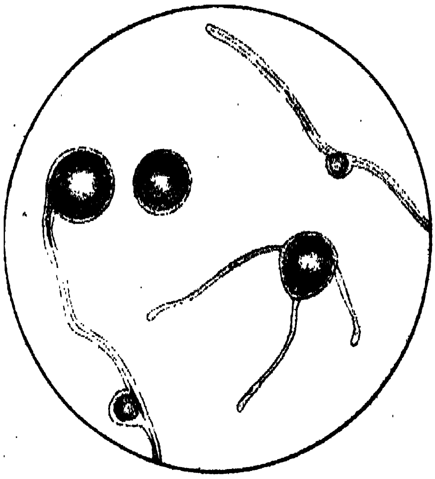
× 330

FIG. IV.



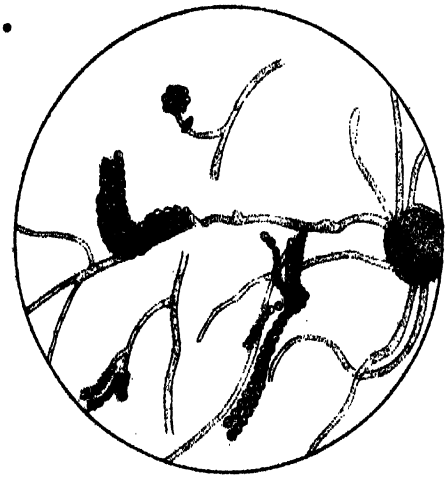
× 330

FIG V



× 330

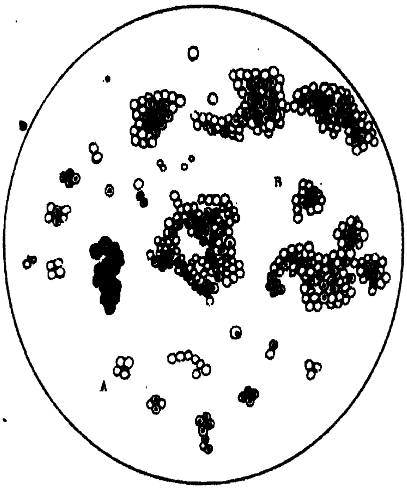
FIG VI

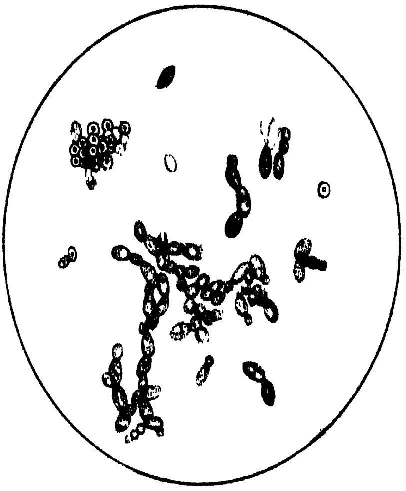


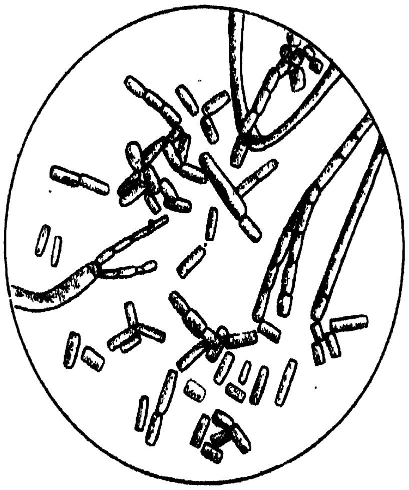
× 330

Engraved by C.W.Chenl, at the Surgeon General's Office.

FIG 1







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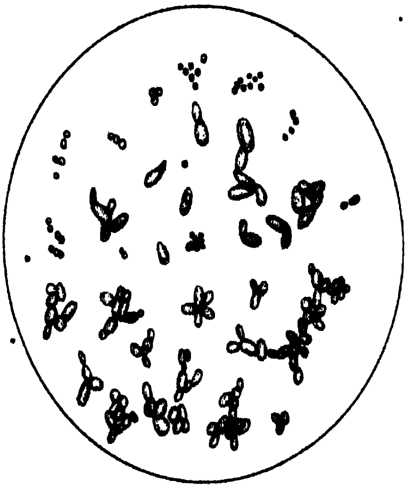

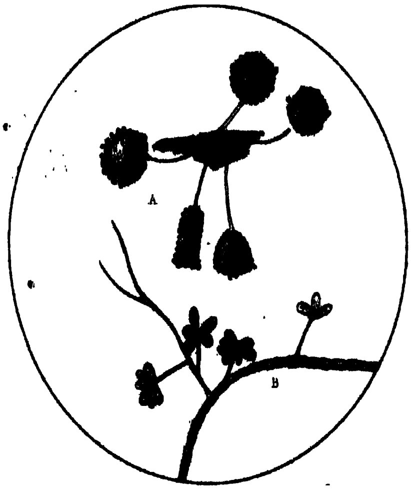

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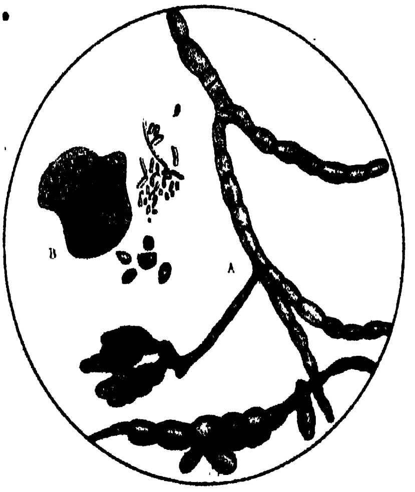

A × 330
B × 700

Engraved by C. W. Chard, at the Surveyor General's Office, Calc.

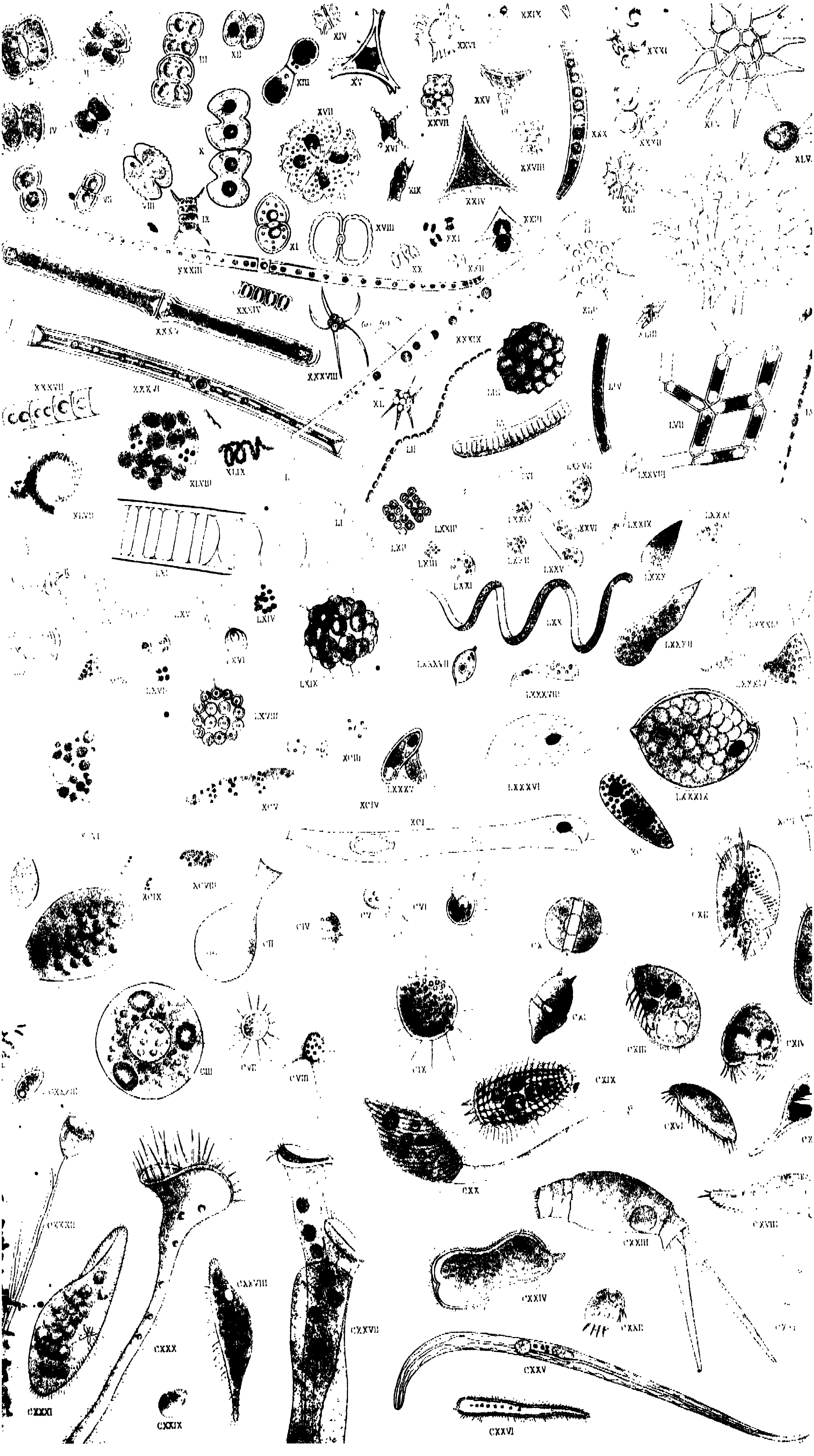
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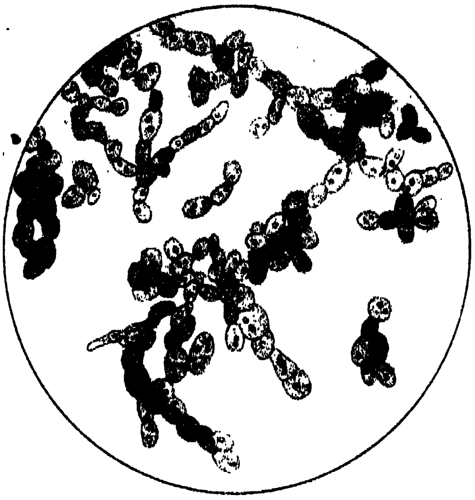
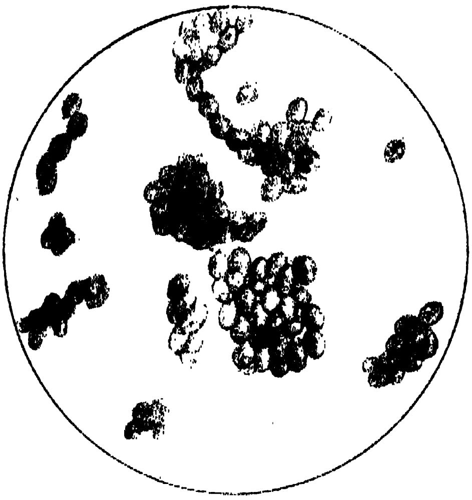
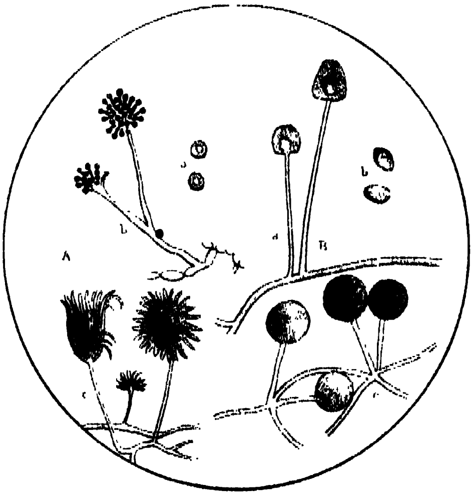
FIG I



× 330

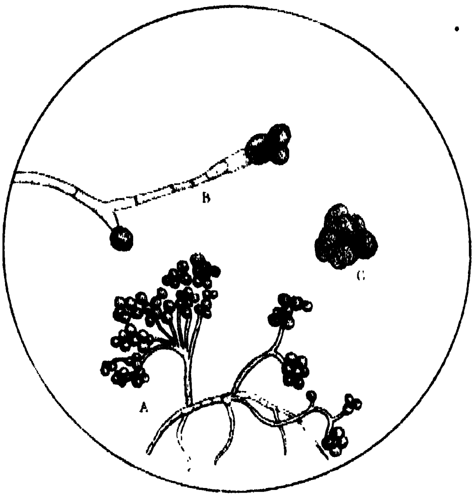
FIG II





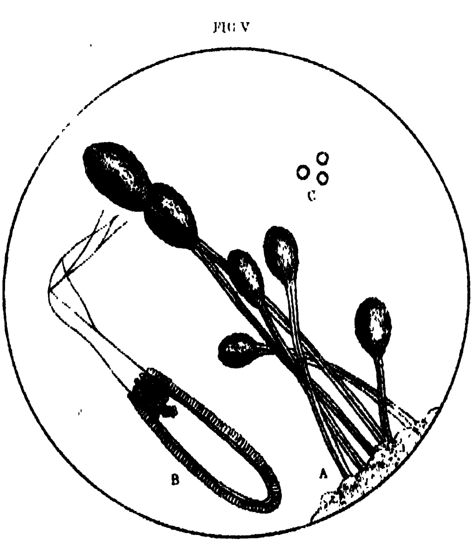
A a × 330
„ b × 103
„ c × 65
B a × 103
„ b × 330
„ c × 41

FIG IV



A × 103
B C × 330

FIG V



A × 41
B × 103
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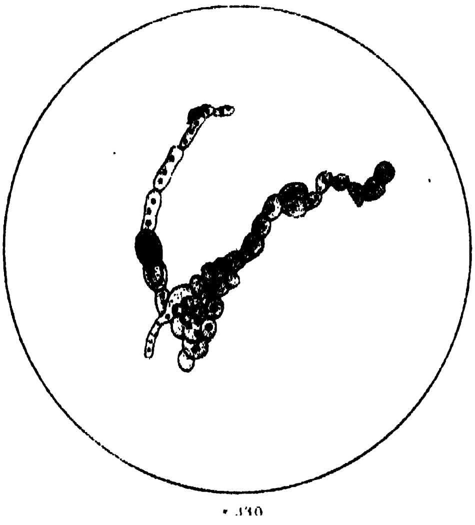

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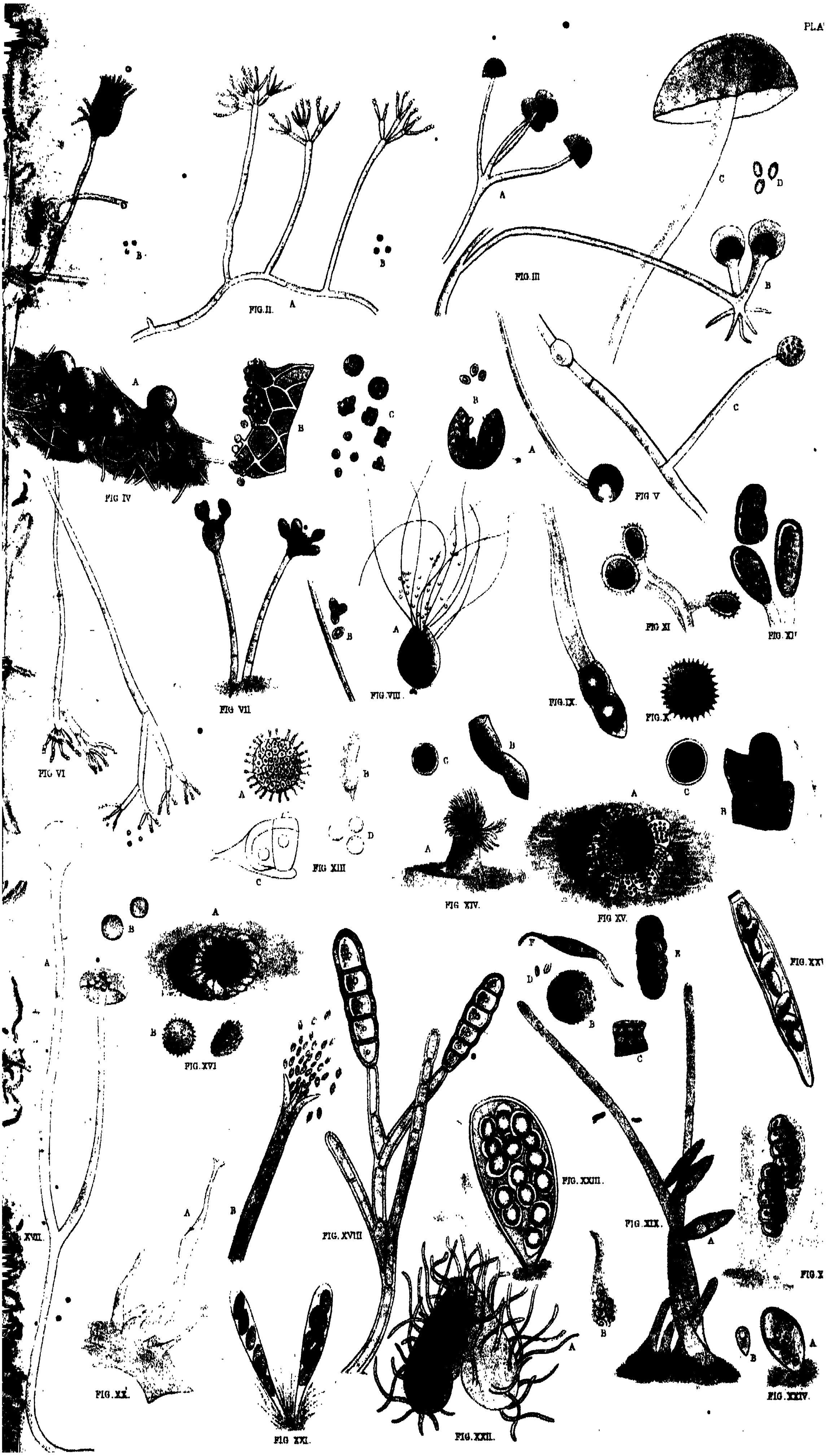
B
FIG. II.
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FIG. III
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FIG IV
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FIG VII
B
FIG. VIII.
A
FIG. IX.
FIG. X
FIG XI
FIG. XI
FIG XIII
A
B
C
D
FIG XIV.
A
B
C
FIG XV.
A
B
C
FIG. XVI
A
B
B
XVII.
A
B
FIG. XVIII
FIG. XIX.
A
B
C
D
E
F
FIG. XX.
A
FIG XXI.
FIG. XXII.
A
B
FIG. XXIII.
FIG. XXIV.
A
B
FIG. XX
FIG. X

APPENDIX C.

REPORT

ON THE

INFLUENCE OF AGE AND LENGTH OF SERVICE

AS AFFECTING THE

MORTALITY AND INVALIDING OF THE EUROPEAN ARMY

OF THE

BENGAL PRESIDENCY.

BY

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CONTENTS.

INTRODUCTION.

SCOPE AND GENERAL ARRANGEMENT OF THE REPORT.

SECTION I.

THE GENERAL STATISTICS OF SICKNESS, MORTALITY, AND INVALIDING IN NEWLY-ARRIVED REGIMENTS CONTRASTED WITH THE STATISTICS OF THE ARMY GENERALLY.

PAGE.

The death-rate of the Army of India fluctuates, within limits, from causes which are appreciable 242
Fluctuation due to exceptional causes—Cholera 242
Fluctuation due to exposure, and to the exaggerated prevalence in certain years of climatic and epidemic influences 242
New Regiments have, as the rule, been cantoned in stations which have a good reputation, and have not suffered from exceptional causes of mortality, except, perhaps, from cholera ... 242
The composition of the death-rate of the Army as a body, for the years from 1860 to 1870 ... 243
The aggregate death-rate for new Regiments, compared with the death-rates for the Army from 1860 to 1870, and with the standard for the ten years 1860-69 244
Composition of the death-rate of new regiments, after excluding cholera and deaths from violence 244
The components of the death-rate alter much during the first three years of Indian Service ... 245
Under exposure, the same components of the death-rate which rise to the top in new regiments, are developed in an exaggerated form... 245
The daily sick-rate of new regiments, compared with that of the Army in general—(*a*), Under exposure in 1858, and (*b*), in newly-arrived regiments in the first and second year, as compared with (*c*), the standard for the ten years, 1860-69 246
The statistics of old and new Troops cantoned together in the same year afford the proper contrast of sick-rates. These are much in excess in the case of the new 246
The admission-rates of the same bodies compared, and their composition in the new bodies contrasted with the standard for the Army 247
The characteristic components of the admission-rate are the same shown in the case of the death-rate 247
These approximate to the standard as regiments become older in relation to the climate of India 247
The relation of new Troops to the influence of epidemic malaria is a contingency. The consequences of exposure may be very serious in the case of newly-arrived regiments 247
The fevers from which new regiments suffer are, as the rule, purely of climatic origin ... 248
Invaliding-rate and its composition, for Troops in the first and second years of Indian Service, contrasted 248
The invaliding-rate of the third year approximates to that of the Army generally 249
Characteristics of the invaliding-rate of Troops exposed in the first year of Indian Service ... 249

SECTION II.

THE STATISTICS OF AGE AND LENGTH OF SERVICE IN NEWLY-ARRIVED REGIMENTS CONTRASTED WITH THE STANDARDS FOR THE ARMY TAKEN AS A BODY.

Composition by Age of the Army of Bengal on the average for the six years, 1865-70 250
The British Soldier in India belongs to the class of old men when he reaches 30 years of age ... 250
Constitution of newly-arrived regiments, as compared with the standard for the Army generally... 250
Composition by age of the new Army of 1858 250
The ratio of liability to death and invaliding increases rapidly with advancing age 251
Army of 1858-62. Ratio in which the men at different ages died from the diseases special to the unacclimatised throughout the period 251
Ratio of liability of men at the different ages to the same diseases in the Army of 1865-70 ... 252
Results in the Army of 1863-64—a body of men well acclimatised, in which the proportion of new soldiers was comparatively small 252
The ratio of liability indicated must in a few instances be looked at in relation to the actuals shown in the same Table, having sometimes no real significance in cases which appear exceptional 255
The results for the period 1865-70, shown in the aggregate, for all causes and for the chief components of the Death Tables 255

PAGE

The ratios of mortality and invaliding in the old soldiers, the men above 30, compared with those for the men between 25 and 29 256
The old soldiers make up, as usual, the bulk of the invaliding, but the invaliding-rate for young men has largely increased in 1869 and 1870 257
Death and invaliding of boys at the age of 20, who are supposed to hold a place intermediate between the first and second classes 257
The proportion of men above 30 has increased year by year from 1865 to 1870, while the most efficient class—the men from 20 to 30—has diminished, and this being the case, we may expect the invaliding-rate to rise relative to the increase of old soldiers 258
The death-rate at different ages in newly-arrived regiments. The rate increases steadily with age 261
Decreases in the second year at all ages. But the relative liability to death at the different ages continues and progresses towards the standard 261
The Invaliding-rate is, generally speaking, low at all ages in the first year, excessive at all ages in the second year, and approaches the standard, except in the case of the old men, in the third year of service 264
Antagonism between the invaliding and deaths from heart-disease in newly-arrived regiments in relation to age 264
Characteristics of the invaliding of the third year 265
Loss by death and invaliding in new regiments in the first three years of service 265
The invaliding of the regiments in the first three years of service has been, with trifling exceptions, of men from one to three years in India 266
Loss of the Army in general by Invaliding at different periods of Indian Service 266

SECTION III.

THE PRACTICAL LESSONS TAUGHT BY THE STUDY OF THE STATISTICS CONTAINED IN THE PRECEDING SECTIONS AND DEDUCED FROM THE MEDICAL HISTORY OF REGIMENTS IN THEIR FIRST YEARS OF INDIAN SERVICE.

The statistics of old and new regiments cantoned together in the same year shown in contrast ... 270
The cholera death-rates contrasted in the cases selected 272
The ratios for regiments and batteries which have arrived in India between 1864 and 1869 shown in detail, and contrasted in the first and second years of Indian Service 274
The diseases of the unacclimatised diminish year by year as the adaptation to heat influence is perfected 274
The constitution of the old Soldier is incapable of undergoing the process of adaptation, or possesses the capability in a much less degree than that of the young Soldier 274
Illustrated from the results in the case of old men under exposure in 1858 275
The Hepatitis of the Army of India is a disease of deterioration, rather than an acute disease developed under exposure 275
Intemperance in the old Soldier almost certainly leads to death under exposure to heat ... 276
A steady process of deterioration goes on during Indian Service, and becomes almost universally manifest in the old men as a class 277
Estimate of annual loss by death and invaliding 277
Details of invaliding in the early years nearly the same in all regiments 278
The special diseases to which young lads are liable in commencing Indian Service 280
The typhoid of the unacclimatised 280
Specially the disease of the young, and of young men in the first year of service 280
Peculiarly a fever of the hot season, although it may occur in any month from exposure ... 281
Typhoid of the young soldier, January to July 1871 281
The course which such a fever is apt to follow illustrated 281
Typhoid is not a disease new to India; want of careful observation has caused its existence to be overlooked—Typhoid between 1844 and 1856 282
Typhoid between 1858 and 1863 282
These illustrations show Typhoid not in outbreaks, but in individual cases, in nearly every cantonment of the Presidency ... ...
Since the arrival of new regiments and large bodies of recruits, the subject has assumed an aspect of great importance—Typhoid of H. M.'s 36th Regiment in 1864 285
Filling up of the lungs subsequent to the attack of Typhoid—a phenomenon observed in the Typhoid of 1851, as well as of 1864 286
The significance of this Typhoid, and its physiological course 286
All new regiments suffer on first coming to India 286
The existence of Typhoid has necessarily attracted notice of late years, and various theories have been framed to account for its development 286
While Typhoid is a disease generated in the individual constitution, it is at the same time a truly zymotic disease, and, as such, liable to spread through a community 287
It is an extraordinary fact that the records of the Native Army and Jail Population afford no authentic history of Typhoid 287

CONCLUSION.

General deduction from the facts recorded 287
The judicious selection of stations for regiments newly-arrived is of great importance ... 288
Stations least subject to epidemic influences should, if possible, be selected 288
It is better to avoid sending to the hills a new regiment which has suffered excessively from heat influence in the first year 288
Question of sending young men and new regiments to the hills on first arriving in India ... 288
It seems contrary to sound principle that young men coming to India as recruits should at once be sent to join their regiments irrespective of the station occupied 288
How the constitution of the Army of India changes from year to year 288
How twelve years of service in India tells upon a body of British Soldiers, traced from the time when it lands in the country until its return to England 291

APPENDIX.

PAGE.
Aggregate Statistics of newly-arrived Troops, in the first and second years of Indian Service ... 293

TABULAR STATEMENTS CONTAINED IN THIS REPORT.

SECTION I.

Fluctuation in the death-rate of the European Army due to cholera 242
Composition of the death-rate of the Army in each year of the eleven years from 1860 to 1870, Cholera being excluded 243
Deaths from different causes out of each 100 deaths in each year of the eleven years, Cholera being excluded 243
Death-rate of new regiments compared with the standard derived from the period from 1860 to 1870 244
Composition of the death-rate of new regiments during the first three years of Indian Service, contrasted 244
Deaths from different causes out of each 100 deaths in the first, second, and third years of service 245
Ratios for diseases developed under exposure among Troops new to the climate of India—Died from different causes out of each 100 deaths in 1858 and 1859 245
Death-rates per 1,000 for the same diseases 245
The daily sick-rate of new regiments compared with that of the Army in general. Daily sick in each month from all causes per 1,000 of strength in the Army in the field in 1858; in the Army as a body on the standard of the ten years 1860-69; and in newly-arrived regiments in the first and second years, between 1864 and 1870 246
Admission-rates of newly-arrived regiments contrasted with the standard for the Army in general, on the same basis as in the case of the daily sick-rate 247
Invaliding-rates of newly-arrived regiments contrasted with the rates for the Army as a body 248
Invaliding of 1858 and of regiments in the first and second years, 1864-70 248
Invaliding of new regiments in the third year compared with the invaliding of the Army as a body on the average of the years 1865-69 249

SECTION II.

Constitution by age of newly-arrived regiments compared with the standard for the Army as a body 250
Composition by age of the new Army of 1858 250
Death-rates at the different ages compared, (*a*) in the new Army of 1858, (*b*) in the Army as a body from 1865 to 1870, and (*c*) in newly-arrived regiments from 1864 to 1869 251
Table showing the ratio in which men of different ages died from fevers, heat apoplexy, dysentery, and hepatitis between 1858 and 1862 252
Ratio of liability to death at the different ages from the same diseases in the Army of the Presidency from 1865 to 1870 252
Deaths in relation to age—Army of 1863 253
Deaths in relation to age—Army of 1864 254
Deaths in relation to age—Army of 1865-70 255
Statement showing in percentages the comparative liability of the soldier above 30 to die as compared with the men aged from 25 to 29, derived from the table for 1865-70 256
Invaliding at the different ages in each year from 1865 to 1870, and the average for the period ... 256
Ratio of invaliding in men above 30, as compared with that for men between 25 and 29 ... 257
Deaths of boys at the age of 20 between 1865 and 1870, and in regiments in the first year of service 257
Statement showing the decrease year by year from 1863 to 1870 of the number of men between 20 and 30, who constitute the most efficient body for service in India, and the steady increase in men above 30 258
Composition of the strength of the Army at different ages in each year from 1863 to 1870 ... 258
Deaths in relation to age of regiments in the first year of Indian Service, 1864-69 259
Deaths in relation to age of regiments in the second year of Indian Service, 1865-70 260
Comparative liability to death at different ages contrasted in the case of the newly-arrived and the Army as a body 261
Invaliding in relation to age of regiments in the first year of Indian Service 262
Invaliding in relation to age of regiments in the second year of Indian Service 263
Invaliding in relation to age of regiments in the third year of Indian Service 264
Invaliding at different ages in the first, second, and third years of service contrasted and compared with the standard for the Army 265
The strength of the Army of Bengal at the different periods of service between 1865 and 1870, and the ratio of invaliding in relation to the number of years of residence in India ... 265
Distribution of the invaliding between 1865 and 1870, according to the number of years of residence in India of the men invalided 265
Statement showing the number of soldiers who had served upwards of three years in India, invalided from regiments in their first three years of Indian Service 266
Deaths of the Army from the chief causes of mortality in each year from 1865 to 1870 shown in relation to age 267

SECTION III.

Acclimatised regiments contrasted with regiments in their first year of Indian Service cantoned in the same station in the same year 270
The aggregate of the cases contained in the preceding table 272
Ratios of sickness, mortality, and invaliding in the first and second years of Indian Service contrasted in the same regiments 273

PAGE.

Table showing the gradual diminution of the ratios for heat fevers, heat apoplexy, and dysentery in the Army between 1858 and 1863 274
Loss by death in H. M.'s 6th and 73rd Regiments in 1858, showing the great liability to death under exposure of men above 30 recently landed in India 275
The proportion which heat fevers, heat apoplexy, and dysentery bear to the total mortality in each year from 1858 to 1863, showing the steady decrease year by year 275
Number of deaths from dysentery in unacclimatised regiments contrasted with the number of deaths from hepatitis in the same regiments 276
Loss of old men in H. M.'s 1-11th Regiment in the first six months of Indian Service ... 276
Ratio of liability to death of young men, men of mature age, and old men, contrasted on the results of the period 1865-70 277
Invaliding rates and causes of invaliding between 1861 and 1870 contrasted for each year ... 277
Aggregate loss of the Army by death and invaliding for each year from 1860 to 1870 277
Details of invaliding in the first, second, and third years of service for each regiment and battery which came to India between 1864 and 1869 278
Deaths from typhoid fever in 1868, 1869, and 1870, shown in relation to the season of their occurrence 280
Deaths from typhoid and continued fevers from January to July 1871, shown in relation to Age... 281
Statement showing the gain and loss of the regiments of the Army of Bengal in strength during the six years from 1865 to 1870 289
Table showing the results of twelve years of Indian Service in a body of men who landed in India with their regiments in the end of 1857 and embarked for England in 1869 and 1870 ... 290

APPENDIX.

Aggregate statistics of newly-arrived regiments—Army of the War Provinces of 1858, to illustrate the results of exposure in the field 295
Newly-arrived regiments in cantonments, 1864-69 296
Newly-arrived regiments in the second year of Indian Service, 1865-70 297

APPENDIX C.

REPORT

ON THE

INFLUENCE OF AGE AND LENGTH OF SERVICE

AS AFFECTING THE

MORTALITY AND INVALIDING OF THE EUROPEAN ARMY.

INTRODUCTION.

In this report I propose to study from a statistical basis the relations of the British soldier to climatic influences, as these affect him on first arriving in India and during the period of his Indian Service.

The statistics of two bodies of men who have served in the Bengal Presidency during the past thirteen years will be employed to illustrate the subject. The experience of the army of 1858, which, taken as a body, reached India towards the end of 1857, will place before us the results that may be expected to follow exposure in the field on first landing in India; and the subsequent history of the same body will furnish the contrast between the ratios of disease determined by the extreme of climatic influences and those which a body which has been subjected to what may be supposed to be acclimatising agencies affords during the period of its cantonment life. And, again, I shall employ the statistics of the regiments which in the course of relief have taken the place of the regiments of 1857-58, to show in what respects a body new to India suffers, although placed during its first year of residence in the conditions deemed the most favourable for the maintenance of health.

These statistics will illustrate the manifestations of special disease brought about in relation to material of a certain constitution. The statistics of age and length of service will also be eliminated and contrasted with the general standards. For, speaking generally, we know that old men, whether new to India or not, die by one class of diseases and young men by another; and that under equal conditions of exposure the results are very different in the case of the old soldier from what they are in the young men.

Up to 1864, no regiments came from England to take the place of those whose period of Indian Service had expired. But annually, since 1864, several fresh regiments have been added to the army of the Presidency, and each of these has had a special history of its own, calculated to teach us what is consistently to be looked for, and to warn us of conditions to be avoided, so that regiments as bodies may be maintained in a state of efficiency during the period of their Indian Service.

The statistics of these new regiments I have carefully arranged, and from the aggregate of the figures I shall try to show the consistency of the history and the chief lessons to be deduced from the facts as they stand recorded.

Of late, various questions have been raised as to the character of the material best adapted to stand the climate of India, and a study of the statistics of the newly-arrived regiments of the past seven years, will, I believe, throw much light, not only upon this special subject of inquiry, but also upon the general problem, how the British soldier may best be cared for under the circumstances necessitated by ten years of residence in India.

I shall treat the subject under three heads—

I.—The general statistics of sickness, mortality, and invaliding in newly-arrived regiments contrasted with the statistics of the army generally.

II.—The statistics of age and length of service in newly-arrived regiments contrasted with the standards for the army taken as a body.

III.—The practical lessons taught by the study of the statistics contained in the preceding sections, and deduced from the medical history of regiments in their first years of Indian Service.

SECTION I.

THE GENERAL STATISTICS OF SICKNESS, MORTALITY, AND INVALIDING IN NEWLY-ARRIVED REGIMENTS CONTRASTED WITH THE STATISTICS OF THE ARMY GENERALLY.

The death-rate of the Army of India fluctuates, within limits, from causes which are appreciable.

It is a mistaken belief that the death-rate of the army of India is apt to fluctuate greatly, without the intervention of any cause sufficient to explain the increase or decrease of the mortality.

Fluctuation due to exceptional causes.

Cholera.

So long as cholera accounts for one-third of the deaths of the European Army, no standard for the comparison of one year with another can be formed without excluding the deaths from this epidemic cause. This, however, is a cause of variation readily appreciable, and, therefore, I place it on one side before showing to what extent diseases more purely climatic enter into the composition of the death-rate of any year:—

Fluctuation in the death-rate due to Cholera.

		Cholera deaths out of each hundred deaths from all causes.	Died from Cholera per 1,000 of Strength.
1860	...	32·74	12·04
1861	...	51·65	23·73
1862	...	34·19	9·61
1863	...	16·95	4·09
1864	...	12·09	2·55
1865	...	12·86	3·12
1866	...	6·82	1·37
1867	...	44·72	13·84
1868	...	8·98	1·81
1869	...	38·39	16·46
1870	...	2·87	·63

Fluctuation due to exposure, and to the exaggerated prevalence in certain years of climatic and epidemic influences.

I shall have occasion subsequently to exhibit the exaggeration of the death-rate caused by exposure in the field, when comparing the statistics of the new army of 1858 with those of recently-arrived regiments; and the figures of the ten years, 1860-69, afford two examples of the increase of mortality which is caused by the persistence of generally prevailing climatic or epidemic agencies, the presence of which stamp the character of the year as one of general sickness, and distinguish it from others in which disease shows itself according to a standard or little above it, or is limited in its geographical distribution. The latter reservation is important, because the area of increased prevalence of both climatic and epidemic disease is in almost every epidemic year provincially defined, although the tract affected may be so extensive as to cover several natural provinces.

New regiments have, as the rule, been cantoned in stations which have a good reputation, and have not suffered from exceptional causes of mortality, except, perhaps, from cholera.

But with such limitations of disease I have no concern in the present chapter. The aggregate figures for the army as a body, will here be placed against the aggregate produced under ordinary or peculiar conditions in bodies of a special constitution. In the aggregate of the statistics for new regiments, no allowance need be made for exaggeration due to epidemic agencies, after cholera is excluded; for, as the new regiments have been cantoned, they have been beyond the area of exceptional sickness, and the statistics represent most fairly the average results of climatic, and not of epidemic, agencies, as exhibited in relation to a body of men brought for the first time in contact with the influences detrimental to health special to the climate of India.

The composition of the death-rate of the Army as a body for the years from 1860 to 1870.

The average death-rate for the army as a body is shown in the Table which follows; the details for the eleven years, 1860-70, are given, and also the composition of the standard derived from the aggregate statistics of the ten-year period, 1860-69:—

Composition of the Death-rate of the Army in each year of the eleven years from 1860 *to* 1870, *Cholera being excluded.*

Causes of Deaths.	Standard of the 10 years 1860 to 1869.	1860.	1861.	1862.	1863.	1864.
Hepatitis	3·31	3·52	2·89	3·03	3·64	2·95
Remittent and Continued Fevers ...	2·92	4·26	3·21	2·76	2·10	2·13
Dysentery	2·72	4·68	3·67	2·66	2·94	1·63
Heat Apoplexy	2·15	2·56	1·34	1·19	1·09	1·46
Phthisis pulmonalis	1·73	1·70	1·85	1·86	2·15	1·61
Injuries and deaths from violence out of hospital	1·39	1·42	1·32	1·45	1·94	1·81
Heart diseases	·98	·51	·47	·46	·61	·87
Respiratory diseases	·99	·92	1·36	1·00	·94	1·01
Diarrhœa	·75	·96	1·69	·91	79	·67
Intermittent Fevers	·66	·59	·76	·58	·72	1·01
Delirium tremens	·48	·77	·45	·44	·48	·40
All other causes	2·66	2·84	3·19	2·16	2·63	3·00
Died per 1,000 from all causes ...	20·74	24·73	22·20	18·50	20·03	18·55

Causes of Deaths.	1865.	1866.	1867.	1868.	1869.	1870.
Hepatitis	3·49	2·71	2·57	3·42	4·94	3·71
Remittent and Continued Fevers ...	2·99	2·43	1·93	2·66	4·33	4·19
Dysentery	2·23	1·68	1·97	1·52	3·23	2·07
Heat Apoplexy	2·98	1·57	2·10	2·78	3·78	1·62
Phthisis pulmonalis	1·38	1·57	1·36	1·55	2·11	1·47
Injuries and deaths from violence out of hospital	1·45	2·09	1·30	1·62	1·62	1·83
Heart diseases	1·02	1·00	1·16	1·36	1·59	1·50
Respiratory diseases	·97	1·23	·84	·79	·69	1·53
Diarrhœa	·64	·49	·40	·19	·32	...
Intermittent Fevers	·72	·80	·70	·22	·38	·09
Delirium tremens	·35	·37	·40	·38	·64	·27
All other causes	2·90	2·80	2·08	1·81	2·80	2·99
Died per 1,000 from all causes ...	21·12	18·74	17·11	18·30	26·43	21·27

Deaths from different causes out of each hundred deaths in each year of the eleven years from 1860 *to* 1870, *Cholera being excluded.*

Causes of Deaths.	Standard of the 10 years, 1860 to 1869.	1860.	1861.	1862.	1863.	1864.
Hepatitis	15·96	14·21	13·04	16·35	18·11	15·89
Remittent and Continued Fevers ...	14·06	17·19	14·44	14·97	10·51	11·47
Dysentery	13·14	18·93	16·55	14·34	14·61	8·81
Heat Apoplexy	10·55	11·65	6·12	6·67	6·40	8·54
Phthisis pulmonalis .. .	8·33	6·86	8·32	10·06	10·75	8·68
Injuries and deaths from violence out of hospital	6·47	3·55†	5·92	6·51	7·49	8·41
Heart diseases	4·80	2·98	2·11	3·52	4·23	5·34
Respiratory diseases	4·75	3·72	6·12	5·41	4·71	5·48
Diarrhœa*	3·63	3·89*	7·62*	4·91	3·99	3·60
Intermittent Fevers	3·20	2·40	3·41	3·14	3·62	5·18
Delirium tremens	2·31	3·14	2·01	2·39	2·42	2·14
All other causes	12·80	11·48	14·34	11·70	13·16	16·16
All causes ...	100·00	100·00	100·00	100·00	100·00	100·00

Causes of Deaths.	1865.	1866.	1867.	1868.	1869.	1870.
Hepatitis	16·54	14·48	15·04	18·69	18·69	17·47
Remittent and Continued Fevers ...	14·12	12·95	11·15	14·53	16·39	19·72
Dysentery	10·56	9·00	11·49	8·30	12·24	9·72
Heat Apoplexy .. .	15·27	8·69	14·36	15·57	14·32	7·61
Phthisis pulmonalis . .	6·50	8·38	7·94	8·48	7·98	6·89
Injuries and deaths from violence out of hospital	4·58	9·60	7·26	8·30	[illegible]	8·59
Heart diseases	5·98	6·56	6·76	7·61	6·01	7·04
Respiratory diseases	4·45	6·56	4·89	4·33	2·62	7·18
Diarrhœa*	3·05	2·59	2·36	1·04	1·20	...
Intermittent Fevers	3·43	4·27	4·22	1·21	1·42	·42
Delirium tremens	1·65	1·98	2·36	2·08	2·41	1·27
All other causes	13·87	14·94	12·17	9·86	10·60	14·09
All causes ...	100·00	100·00	100·00	100·00	100·00	100·00

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* An indefinite term which has of late years nearly disappeared, as the Returns have become more accurate; on this account I have not associated Diarrhœa with Dysentery in the Table. The Diarrhœa of the earlier years of the period meant Cholera, Chronic Dysentery, or Typhoid Fever.

† The record of deaths out of hospital is evidently incomplete for this year.

The aggregate death-rate for new regiments compared with the death-rates for the Army from 1860 to 1870, and with the standard for the ten years 1860-69.

This period of eleven years affords two seasons of excessive sickness, 1860 and 1869, to both of which a special history is attached. The excess of these years is a fair counterbalance against the exceptionally healthy years, 1862, 1864, 1866, and 1868, and the standard of the ten years is evidently a correct representation of a year of average health. That 1867—a notoriously unhealthy year as regards cholera—shows the smallest death-rate of these eleven years, is due less to the fact that it was an unusually healthy year, than to the circumstance that of the 479 men who died from cholera as many bad lives would have succumbed to climatic diseases as would have brought up the ratio to that of other ordinarily healthy years.

Death-rate per 1,000 *of Strength, for the Army of Bengal from* 1860 *to* 1870, *after excluding Cholera.*

Unhealthy Years.	Healthy and Ordinary Years.	Standard of Ten Years.
	1867 ... 17·11	
	1868 ... 18·30	
	1862 ... 18·50	1860-69 ... 20·74
1860 ... 24·73	1864 ... 18·55	Cholera ... 9·24
1869 ... 26·43	1866 ... 18·74	
	1863 ... 20·03	29·98
	1865 ... 21·12	
	1870 ... 21·27	
	1861 ... 22·20	

It is with this standard that the death-rate of new regiments is to be compared.

Death-rate of New Regiments compared with the above standard.

	Excluding Cholera.	Cholera.	All Causes.
First year ...	32·58	15·52	48·10
Second year ...	24·61	3·33	21·28
Third year ...	16·32	2·09	18·41

These figures seem to teach that a new regiment landed in India attains the norma standard of health in its third year of residence, and that in the first year both climatic and epidemic causes tell powerfully against the new material, which suffers in the second season also from the same causes in a modified form.

Composition of the death-rate of new regiments, after excluding cholera and deaths from violence.

This will be more clearly defined by placing the components of the death-rate of the three first years of residence in contrast :—

Composition of the Death-rate of New Regiments during the first three years of Indian Service contrasted.

(CHOLERA AND DEATHS FROM VIOLENCE EXCLUDED.)

CAUSES OF DEATH.	First Year (1864-69.)	Second Year (1865-70.)	Third Year (1866-70.)
	Strength, 14,304	Strength, 14,423	Strength, 13,415*
Fevers	8·46	5·20	3·43
Heat Apoplexy ...	8·18	2·01	·82
Dysentery	3·98	2·42	1·49
Hepatitis	3·71	3·33	2·83
Phthisis pulmonalis ...	2·38	2·15	2·16
Respiratory diseases ...	1·40	·62	·75
Heart diseases ...	·91	1·25	1·12
Delirium tremens ...	·63	·42	·30
All other diseases ...	2·09	2·29	2·23
All diseases	31·74	19·69	15·13

The ratio of liability to death from purely climatic diseases—heat fevers, heat apoplexy, and acute dysentery—steadily diminishes during the first three years; and hepatitis, heart disease, and phthisis, the diseases to which the older soldier is more peculiarly subject, have not yet begun to make a decided impression on the death-rate of the new body.

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* The strength of the 1-14th and 62nd Regiments is excluded, since the statistics of 1871 are not yet available.

The components of the death-rate alter much during the first three years of Indian Service.

While the ratio of liability to climatic diseases diminishes, the causes of death alter, showing that the body is passing through distinct changes in its relations to climatic influences. Heat fevers continue to account for one-fourth of the mortality, and dysentery for one-eighth; but heat apoplexy, which in the first year caused 26 per cent. of the total mortality, affords but 10 per cent. in the second year, and 5·50 in the third. Again, hepatitis, which caused 12 per cent. of the total mortality in the first year, gives 17 per cent. in the second and 19 per cent. in the third year; heart disease in the first year made up 3 per cent. of the total, in the second 6·34 per cent., and in the third 7·50; and the proportion attributed to phthisis was, in the first year 7·49, in the second 10·92, and in the third 14·50.

Died out of each hundred deaths.

	First Year.	Second Year.	Third Year.
Fevers ...	26·65	26·41	23·00
Heat Apoplexy ...	25·79	10·21	5·50
Dysentery ...	12·55	12·32	10·00
Hepatitis ..	11·67	16·90	19·00
Phthisis pulmonalis ..	7·49	10·92	14·50
Respiratory diseases...	4·40	3·17	5·00
Heart diseases ...	2·86	6·34	7·50
Delirium tremens ...	1·98	2·11	2·00
All other diseases ..	6·61	11·62	13·50
	100·00	100·00	100·00

Under exposure, the same components of the death-rate which rise to the top in new regiments, are developed in an exaggerated form.

Under exposure to the extreme of climatic influences, the same manifestations in disease occur in the case of a new body. Heat fevers, heat apoplexy, and dysentery rise to the top; but the proportion is reversed, and dysentery occupies the first place.

Ratios for diseases developed under exposure among Troops new to the climate of India.
Died out of each hundred deaths in 1858 *and* 1859.

	Army of 1858—Army of the War Provinces.		Army of 1858—Army as a body.		Army of 1859	
Dysentery ...	38·71	82·26	38·68	80·44	35·61	66·80
Heat Apoplexy ...	21·92		20·42		12·54	
Fevers ...	21·63		21·34		18·65	
Hepatitis ...	6·58	17·74	6·72	19·56	13·77	33·20
Respiratory diseases...	2·54		2·78		2·62	
Phthisis pulmonalis ..	1·58		2·52		5·04	
Delirium tremens ...	·56		·73		1·95	
Heart diseases ...	·39		·48		1·60	
All other diseases ...	6·09		6·33		8·22	
	100·00		100·00		100·00	

Ratio per 1,000 *in which the new Army of* 1858 *died in* 1858 *and* 1859 *from the chief causes of mortality.*

(CHOLERA AND DEATHS FROM VIOLENCE EXCLUDED.)

	Army of the War Provinces, 1858.	Army of 1858 as a body.	Army of 1859.
Dysentery ...	33·67	39·25	12·58
Heat Apoplexy ...	17·77	22·23	4·40
Fevers ...	18·57	21·93	6·58
Hepatitis ...	5·84	6·67	4·86
Respiratory diseases...	2·42	2·57	·92
Phthisis pulmonalis ...	2·19	1·60	1·78
Delirium tremens ...	·64	·57	·69
Heart diseases ...	·41	·40	·56
All other diseases ...	5·51	6·17	2·89
All diseases ...	87·02	101·39	35·26

The figures for these two years stand alone. They afford an estimate for the loss likely to occur, should the occasion arise for throwing a new army into the field, and exposing it during the hot season and the rains with insufficient shelter. And the estimate is not overstated, for 1858 was essentially a healthy and a non-epidemic year.

The Daily Sick-rate of New Regiments compared with that of the Army in general.

Daily sick from all causes per 1,000 of Strength.

The daily sick-rate of new regiments compared with that of the army in general—*(a)* Under exposure in 1858, and *(b)* in newly-arrived regiments in the first and second year, as compared with *(c)* the standard for the ten years, 1860-69.

	Army of 1858 in the field. (a new body under exposure.)	Army as a body, average of the ten years, 1860—69.	New regiments in first year, 1864—69.	New regiments in second year, 1865—70.
January ...	82·7	57·7	48·0	54·8
February ...	74·1	58·8	47·5	53·7
March ...	85·2	61·2	49·1	51·5
April ...	113·7	64·9	57·4	58·2
May ...	137·4	69·2	61·8	68·1
June ...	157·0	70·5	75·3	70·1
July ...	140·6	72·7	72·3	69·3
August ...	143·1	76·3	75·0	71·1
September ...	153·7	79·2	80·7	81·1
October ...	137·5	74·4	81·1	80·9
November ...	100·0	64·3	65·8	67·0
December ...	83·6	54·8	55·4	48·1
	117·8	67·1	64·0	64·5

Landing in India at the healthiest season of the year, new regiments naturally give in the first months a lower daily sick-rate than those regiments which have their sick remaining from the previous year. This point is illustrated in looking at the daily sick-rate of the same body in the second year, which, although still below the average for the army regarded as a body, is beginning to approximate to the general standard. These remarks apply to the daily sick-rates of January, February, and March; the new body shows consistently the lowest rate, the same body in the year following comes next, and it is superior to the standard formed for the army generally from the statistics of the years 1860-69. With the setting in of the hot season, the daily sick-rate increases month by month, rising from 57 per 1,000 in April to 62 in May, and to 75 in June. With the clouding over of the sky, and the setting in of monsoon influences, further rise is arrested during July and August; but the persistence of heat and moisture brings about special manifestations in disease, and the highest sick-rate of the year is attained in September and October, when 8 per cent. of the strength is constantly under treatment. The ratio of November indicates that the sick are rapidly leaving the hospital, and from December to the March following, the sick-rate remains steadily between 52 and 55 per 1,000.

In the second year the same is repeated. There is the sudden rise from 52 to 58 in April; and for the next four months the daily-sick continues fixed at 7 per cent., and it rises to 8 per cent. in September and October. The diminution of sickness in November and the fall to a minimum in December is parallel with the diminution and fall observed in the previous year.

In the case of the army of 1858, the daily sick-rate of the hot season was consistently double of that of the standard, for each month from May to October. In May and October the ratio was the same, 137 per 1,000; the maximum was attained in June and September, when the ratios were 157 and 154, the former indicative of the predominance of diseases due to heat influence, and the latter to the almost universal prevalence of the visceral affections determined by heat, moisture, and exposure. In July and August, the interval between the maxima, 140 and 143 per 1,000 were constantly under treatment. The occurrence of high ratios in the cold months implies merely the accumulation of cases of serious sickness remaining over from the unhealthy season.

The statistics of old and new troops cantoned together in the same year afford the proper contrast of sick-rates. These are much in excess in the case of the new.

It is unfair to place the standard of the ten years in comparison with the monthly sickness of new regiments. The statistics of bad stations and bad years, which, as I have said, have had no special effect in raising the sick-rate of new regiments, have in every year added much to the sick-rate of the army as a body. The opening paragraph of the third section of this paper, where the statistics of old and new troops cantoned in the same station in the same year are exhibited in contrast, shows that the daily sick-rate is very much in excess in the case of the young regiments—being in the aggregate of the examples tabulated as 84 to 52 on the average for the year.

These remarks apply to the admission-rate also. The statistics of the new and old troops cantoned together show the admission-rate of the new regiments as 2,026, in contrast with 1,219 per 1,000 in the case of the old.

The admission-rates of the same bodies compared, and their composition in the new bodies contrasted with the standard for the Army.

Admission-rates of newly-arrived Regimetns contrasted with the standard for the Army in general.

Admission-rate per 1,000 *of Strength.*

CAUSES OF ADMISSIONS.	Standard of the 10 years 1860-69.	NEWLY-ARRIVED REGIMENTS.		New Army in the field, 1858.
		1864-69, (first year.)	1865-70, (second year.)	
Cholera ...	14·7	18·7	4·5	5·0
Intermittent Fevers ...	439·0	140·0	345·7	1333·3
Remittent and Continued Fevers ...	194·0	383·9	237·7	
Heat Apoplexy ...	4·3	16·8	4·6	55·8
Delirium tremens ...	4·7	3·6	5·3	6·2
Dysentery ...	48·9	66·2	47·3	231·7
Diarrhœa ...	109·4	153·1	88·0	303·5
Hepatitis ...	59·2	35·6	52·4	69·0
Phthisis pulmonalis ...	8·2	12·2	11·3	6·0
Respiratory diseases ...	74·7	87·3	68·9	92·3
Venereal diseases .	265·5	235·4	238·6	270·6
All other causes ...	532·3	485·6	456·1	725·0
ALL CAUSES ...	1754·9	1638·4	1560·4	3098·4

Many circumstances conduce to make the aggregate of the admission-rate of new troops approach to the aggregate of the standard for the army in general. New troops come from England with constitutions which are supposed to be sound, while the older soldier is constantly liable to the recurrence of disease in the course of the deterioration which his system naturally undergoes under the prolongation of exposure to the climate of India. The radical distinction is, that the newly-arrived soldier suffers from acute disease, and the older soldier from chronic disease; while the admission-rate of the new soldier is very much in excess as regards acute disease, it is much below the average when the statistics of chronic disease are placed side by side.

The same diseases which determine the special constitution of the death-rate in the case of new regiments appear in excess in the admission-rate. The fevers of the hot season are doubled, and the liability to heat apoplexy is quadrupled in the case of the new soldier, and dysentery and diarrhœa also rise much above the standard rate. On the other hand, fevers returned as intermittent are shown to be three times more prevalent among the old than the young, and hepatitis, which in the young gives a ratio of 36, stands on the average of the ten years at 59.

The characteristic components of the admission-rate are the same shown in the case of the death-rate.

In the second year of residence the admission-rates are rapidly approaching the standard. Heat fevers, heat apoplexy, dysentery, and diarrhœa are running down in the scale; and hepatitis and intermittents have risen in proportion.

These approximate to the standard as regiments become older in relation to the climate of India.

But the ratio for intermittents shown in the table for troops in the second year is exaggerated. The 92nd, 85th, and 1-6th Regiments had the misfortune to be cantoned within the area covered by epidemic malaria in 1869; and these three regiments alone, stationed at Jullundur, Meean Meer, and Rawulpindee, out of a strength of 2,500, furnished upwards of 3,000 admissions from malarious fevers between August and December. The remainder of the body in its second year, cantoned on the east of the line limiting the epidemic malaria of the year, gave, in the same months, less than 1,000 admissions out of a strength of 12,000.

The relation of new troops to the influence of epidemic malaria is a contingency. The consequences of exposure may be very serious in the case of newly-arrived regiments.

It is a contingency, and a fortunate one, that regiments on their first year have suffered so little from intermittents; the history of former years tells how terrible in some cases has been the mortality when a regiment new to India, after the suffering incident to the first hot season, has in the later months chanced to be included in a provincial area suffering universally from an epochal visitation of malarious fever. An example of this occurring in the period under consideration, was that of the 21st Fusiliers at Kurrachee in 1869.

The fevers from which new regiments suffer are, as the rule, purely of climatic origin.

Standing as the figures do in the preceding table, the comparative exclusion of the element of malarious fevers is of advantage, as teaching that the fevers from which the young men chiefly suffer are of climatic and not of specific origin. The figures for 1858, taken month by month, show this perfectly. The characteristic of a non-epidemic year is the fall of the fever-rate from the hot season to the end of the year; while a rapid rise culminating in October and November marks an epidemic season.

The fever-admissions of 1858 *shown month by month, to indicate the characteristics of a non-epidemic year.*

[ALL VARIETIES OF FEVER IN A STRENGTH OF 30,000.]

	January.	February.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
1858 ...	706	836	1,710	3,672	5,908	6,547	5,190	5,011	4,146	3,458	1,675	1,090

Although 1858 was a healthy and non-epidemic year, the admission-rate, as shown in the last column of the table on the previous page, was excessively high, heat fevers, dysentery, and heat apoplexy having prevailed to an enormous extent. And this is no exaggerated estimate; for the very same ratios will certainly re-appear, should a new army again be subjected to the same degree of exposure as in 1858.

Invaliding-rates of newly-arrived regiments contrasted with the rates for the Army as a body.

Invaliding-rate and its composition, for troops in the first and second years of Indian Service, contrasted.

We are prepared to find that the invaliding-rate for new regiments is below the average for the army; and while the tables which follow show that it is so, they show also that even in the second and third years almost as many men are invalided as from old regiments. It is in the third year that the new body furnishes very nearly the same ratio of invaliding, and the same details in the composition of the ratio, as the army taken on the average.

Invaliding-rates in the first and second years of Indian Service contrasted.

[REGIMENTAL STRENGTH REPRESENTED—14,198 IN FIRST YEAR, AND 15,016 IN SECOND YEAR.]

CAUSES OF INVALIDING.	NUMBER INVALIDED.		INVALIDED PER 1,000.		Army of 1858.
	First Year.	Second Year.	First Year.	Second Year.	
Fever	24	34	1·66	2·26	5·41
Sunstroke, results of ...	12	6	·83	·40	·57
Dysentery and Diarrhœa ...	48	53	3·32	3·53	5·66
Hepatitis	49	122	3·38	8·12	4·66
Spleen enlargement ...	...	3	...	·20	...
Scrofula	...	8	...	.53	...
Phthisis pulmonalis ...	95	82	6·55	5·46	1·39
Rheumatism	25	38	1·72	2·53	4·36
Syphilis	25	31	1·72	2·06	1·01
Stricture of urethra ...	...	4	...	·27	...
Heart disease	33	85	2·28	5·93	1·85
Palpitation	...	4			
Bronchitis and Pleurisy ...	11	32	·76	2·13	1·58
Mental affections	16	12	1·11	·80	·55
Cephalœa	6	5	·41	·33	...
Epilepsy	10	7	·69	·47	·34
Ophthalmia and defective vision	2	10	·14	·67	1·39
Deafness	3	10	·20	·67	...
Dropsy	3	3	·20	·20	...
General debility	16	101	1·10	6·73	2·00
Injuries	10	23	·69	1·53	6·00
All other causes	30	44	2·07	2·93	6·82
	418	717	28·83	47·75	43·59

*Invaliding of third year (*1866-70*), compared with the Invaliding of the Army as a body, on the average of the years* 1865-69.

	THIRD YEAR.	ARMY OF BENGAL, 1865-69.
Fever	2·54	3·14
Dysentery	1·94	2·62
Hepatitis	6·93	6·96
Spleen disease ...	·30	·43
Phthisis pulmonalis ...	3·43	3·65
Rheumatism... ...	4·17	3·88
Syphilis	2·98	3·19
Heart disease ...	3·21	3·74
Bronchitis and Pleurisy ...	2·09	1·55
Apoplexy and Epilepsy ...	1·27	·79
Ophthalmia	·67	·54
Debility from climate ...	8·05	10·19
Injuries	·75	·82
All other causes ...	8·41	7·69
Invalided per 1,000 ...	46·74	49·19

The invaliding-rate of the third year approximates to that of the Army generally.

In the invaliding-rates of the first year, debility from climate, heart disease, and hepatitis are repressed; the aggregate rate per 1,000 for these three causes of invaliding is in the first year 6·76, and in the second 20·78. Heat fever, sunstroke, and dysentery do not in any year send home a large proportion of the invalids, climatic influences seeking other manifestations by which in the end the constitution is sapped; the aggregate ratios for the three amount only to 5·81 per 1,000 in the first year, and to 6·19 per 1,000 in the second. Phthisis gives a ratio representing nearly one-fourth of the invaliding from disease in the first year; and this disease probably appears naturally in this position, for reasons to which I shall afterwards allude. The ratio, however, as it stands, is higher than what is normal; for one regiment (Her Majesty's 36th in 1864) contributed 39 out of the total of 95 cases, as a sequel to the fever from which it suffered so severely.

Characteristics of the invaliding-rate of troops exposed in the first year of Indian Service.

As I have said above, it is less acute climatic disease than continued exposure which determines the extent of invaliding. Hence, with all its exposure and all its suffering, the army of 1858 gives an invaliding-rate of only 37·59 per 1,000, after excluding injuries, of which one-third is made up of dysentery, fever, and apoplexy. Hepatitis, heart disease, and debility from climate, represented in the standard of 1865-69 by a ratio of 20·89, show in 1858 a ratio of 8·51 per 1,000 only; and, what is remarkable, phthisis shows a ratio of only 1·39 per 1,000, a result very much at variance with that shown in the case of the new troops in the first and second years, and, indeed, much more favourable than that of any year between 1858 and 1870. It is difficult to account for the phenomenon unless we suppose that the enormous increase of acute disease afforded in many cases an outlet for the elements of disease which, if retained, would have become manifest in tubercular deposit. It is true that in the case of the army in the field, the death-rate from phthisis is higher than that of the army in any year since 1858; but the increase is not excessive, as might have been expected, and, indeed, it is almost identical with that of the new troops in the later years:—

Death-rate per 1,000 *from Phthisis.*

ARMY IN THE FIELD.	NEW TROOPS.	NEW TROOPS.
1858.	1864-69.	1865-70.
2·19	2·15	2·16

The very interesting question of the etiology of the lung deposit which is apt to take place in young men soon after arrival in India, is further alluded to in the third Section, in connection with the consideration of the nature of the typhoid of the unacclimatised.

SECTION II.

THE STATISTICS OF AGE AND LENGTH OF SERVICE IN NEWLY-ARRIVED REGIMENTS CONTRASTED WITH THE STANDARDS FOR THE ARMY TAKEN AS A BODY.

Composition by age of the Army of Bengal on the average for the six years 1865-70.

Taking the strength from 1865 to 1870, the composition of the army of Bengal at the different ages was as follows :—

Under 20.	20-24.	25-29.	30-34.	35-39.	40 and upwards.	TOTAL.
4·85	38·38	28·09	20·17	7·24	1·27	100
			28·68			

The natural division of the body is into four; boys, young men, mature soldiers, and old soldiers. The boys below 20, taking the average of these six years, do not constitute one-twentieth of the force; 38 per cent. of the strength was under 25, 28 per cent. above 25 and under 30, and 29 per cent. was above 30 years of age. The diseases and death-rate of the boys is a very important subject for consideration; but, practically, the question resolves itself into the study of three bodies—the young men, the mature men, and the old men.

The British soldier in India belongs to the class of old men when he reaches 30 years of age.

I have not considered it worth while to make any distinctive ratios for men at the older periods, from 35 to 39 and 40 and upwards. The British soldier who would be reckoned young in England, is, in India, an old man at 30, whether he reaches this age in the course of Indian Service or lands with his regiment.

Constitution of newly-arrived regiments as compared with the standard for the Army generally.

In newly-arrived regiments, during the same period, the strength of boys has been higher, the strength of young and matured men much the same as the average for the army, and the strength of old men 9 per cent. below the average :—

NEWLY-ARRIVED REGIMENTS, 1864-69.

Distribution of the Strength by Age on arrival in India.

Below 20.	20-24.	25-29.	30-34.	35-39.	40 and upwards.	TOTAL.
2,088	5,790	3,993	2,067	751	113	14,802
14·11	39·12	26·97	13·96	5·07	·77	100
			19·80			

The disproportion most evident in this table is the excess of old men, one-fifth of the body being composed of men whose normal ratios of mortality and invaliding stand far above those of the younger men.

Composition by Age of the new Army of 1858.

For the earlier years of the period, the strengths of the army were, unfortunately, differently divided off; but we may judge that the proportion of men at different ages was very nearly what is shown above for the new regiments :—

Army of April 1858—Distribution of the Strength by Age.

20 and under.	21-26.	27-36.	36 and upwards.	TOTAL.
6,967	18,652	14,361	2,820	42,800
16·28	43·58	33·55	6·59	100

These are the strengths which I shall compare in the following tables; and although the ratios for the two periods 1858-62 and 1863-70 cannot be accurately placed one beside the other for comparison, the general lessons will be found of the same import.

The ratio of liability to death and invaliding increases rapidly with advancing age.

Whichever body we may choose for illustration, the rapidity of the increase of the death-rate with age is most striking. Whether under exposure, in the routine of cantonment life, or in the special conditions of the newly-arrived body, the phenomenon is constant:—

Death-rates at the different ages compared (a) in the new Army of 1858, (*b*) *in the Army as a body from* 1865 *to* 1870, *and* (*c and d*) *in newly-arrived regiments from* 1864 *to* 1870.

(*a*).—Army of 1858.

	20 and under.	21-25.	26-35.	36 and upwards.	
Died per 1,000 ...	48·80	74·30	108·07	131·94	
Ratio of liability ...	13·44	20·48	29·76	36·32	100·00

(*b*).—Army as a body, 1865-70.

	(Excluding Cholera.)				
	Under 20.	20-24.	25-29.	30 and upwards.	
Died per 1,000 ...	7·61	13·67	17·41	29·94	
Ratio of liability ...	11·09	19·92	25·37	43·62	100·00

(*c*).—Newly-arrived Regiments, 1864-69.

	(Excluding Cholera.)				
	Under 20.	20-24.	25-29.	30 and upwards.	
Died per 1,000 ...	12·93	24·87	39·32	47·08	
Ratio of liability ...	10·41	20·02	31·66	37·91	100·00

(*d*).—Newly-arrived Regiments in second year, 1865-70.

	(Excluding Cholera.)				
	Under 20.	20-24.	25-29.	30 and upwards.	
Died per 1,000 ...	3·95	15·84	23·08	35·61	
Ratio of liability ...	5·03	20·18	29·41	45·38	100·00

I might here show the same phenomenon of increase with age of the invaliding-rate, but this subject will be subsequently considered.

Army of 1858-62—Ratio in which the men at different ages died from the diseases special to the unacclimatised throughout the period.

In the first section I have shown that the diseases which rise to the top in the newly-arrived regiments are—heat fevers, heat apoplexy, and dysentery, hepatitis holding an important but secondary place in the scale. In the table which follows, the ratio in which the men at the different ages died from these diseases between 1858 and 1862 is shown. The first half of the table illustrates very beautifully, how, while during this period the death-rate became less year by year, the improvement took place in men at all the periods. But the table as a whole is chiefly intended to show the ratio of liability in the same year of men of different ages. Thus, heat apoplexy is the disease to which the old soldier is always ready to succumb, and in 1858, while 7 per 1,000 of boys, of 20 and under, died, 36 per 1,000 of men above 35 were lost; or, in other words, if the ratio of liability to die be estimated at 100, the liability in the case of the two classes was 8·51 and 43·80 respectively, or nearly five times as great in the one case as in the other. Or, again, to reverse the case, in 1860, young boys died of fevers at the rate of 5·58 per 1,000, while the men above 35 lost only 2·73 per 1,000 from the same cause, the ratio of liability being in the case of the young 35·34, and in the case of the old 17·28.

Table showing the ratio in which men of different ages died from Fevers, Heat Apoplexy, Dysentery, and Hepatitis between 1858 *and* 1862.*

CAUSES OF DEATH.		DIED PER 1,000 OF STRENGTH.				RATIO OF LIABILITY IN PERCENTAGES.				
		20 and under.	21 to 25.	26 to 35.	Upwards of 35.	20 and under.	21 to 25.	26 to 35.	Upwards of 35.	TOTAL.
FEVERS ...	1858	14·06	16·24	14·76	17·02	22·65	26·16	23·78	27·41	100
	1859	11·52	8·66	5·80	9·59	32·38	24·35	16·31	26·96	100
	1860	5·58	4·28	3·20	2·73	35·34	27·11	20·27	17·28	100
	1862	2·95	4·30	3·00	3·69	21·16	30·85	21·52	26·47	100
HEAT APOPLEXY	1858	7·03	15·23	24·16	36·17	8·51	18·44	29·25	43·80	100
	1859	3·96	5·18	7·53	9·12	15·36	20·08	29·20	35·36	100
	1860	1·79	1·83	2·32	5·13	16·17	16·53	20·96	46·34	100
	1861	·38	·90	1·35	6·25	4·28	10·14	15·20	70·38	100
	1862	·50	·53	1·80	1·64	11·19	11·85	40·27†	36·69†	100
DYSENTERY ...	1858	22·39	30·08	30·57	38·30	18·45	24·79	25·19	31·57	100
	1859	16·74	14·42	13·53	27·35	23·24	20·02	18·78	37·96	100
	1860	4·78	4·18	5·07	7·18	22·54	19·71	23·90	33·85	100
	1862	·48	3·00	3·81	5·74	3·68	23·03	29·24	44·05	100
HEPATITIS ...	1858	3·30	4·98	8·01	9·57	12·76	19·26	30·98	37·00	100
	1859	2·34	3·87	6·73	9·12	10·61	17·54	30·51	41·34	100
	1860	1·00	2·02	3·75	5·47	8·17	16·50	30·64	44·69	100
	1862	·00	1·88	4·06	3·69	·00	19·52	42·16	38·32	100

The general significance of the table is this—that the young men will die from fevers in as great a proportion as the old men, sometimes in a much greater proportion; that heat apoplexy, while it may attack men of all ages, is specially the disease of the old soldier; that while under exposure all classes of the unacclimatised are prone to succumb to dysentery nearly in equal proportion, the old soldier continues to die, while the young soldier loses to a great degree his susceptibility to dysentery; and that in the case of hepatitis there is consistently a broad line of distinction between men above and below 25, the ratio of liability being doubled in the case of the older class.

Ratio of liability of men at the different ages to the same diseases in the Army of 1865-70.

For comparison, I shall place here the aggregates for the last six years to show the great tendency of the young men to succumb to fever and of the old men to die by heat apoplexy, dysentery, and hepatitis.

Army of the Presidency, 1865-70. *Ratio of liability to death at the different ages, from Fevers, Heat Apoplexy, Dysentery, and Hepatitis.*

	Under 20.	20 to 24.	25 to 29.	30 and upwards.	TOTAL.
Fevers	30·07	32·08	17·85	20·00	100·00
Heat Apoplexy... ...	10·55	13·80	26·15	49·50	100·00
Dysentery	7·21	23·04	29·24	40·51	100·00
Hepatitis	·87	16·78	29·49	52·86	100·00

Results in the army of 1863-64, a body of men well acclimatised, in which the proportion of new soldiers was comparatively small.

To link on the statistics of the earlier with the later period, the tables for 1863 and 1864 are interposed; these are arranged after the method followed in the subsequent years. In both years the favourable death-rate of the older soldiers is worthy of note, an occurrence due, no doubt, to the circumstance, that the men of the army above 30 had reached this age through Indian Service, and were not men landed in India and passing through the experience incident to new comers. The death-rates for the young men are also very favourable in both years, although the deaths of young men in the three new regiments which came to India in 1864, contributed considerably to the ratio in the latter year.

Died per 1,000 *of Strength in* 1863 *and* 1864.

	(EXCLUDING CHOLERA.)			
	Under 20.	20 to 24.	25 to 29.	30 and upwards.
1863	5·98	13·95	24·46	26·16
1864	9·92	9·51	20·78	27·54

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* The Returns for 1861 being imperfect, the ratios for the year are omitted in this Table except in the case of Heat Apoplexy.
† These are ratios for small numbers. The deaths from Heat Apoplexy in 1862 were 51 only.

The component elements of these rates are also consistent with those of the tables which follow :—

Distribution of the Strength of the Army according to Age at the beginning of 1863.

TOTAL STRENGTH.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.
					8,409	
41,451	1,339	16,491	15,212	5,642	2,301	466

Deaths of 1863, *and the Death-rates per* 1,000 *of the Strength at the different Ages.*

CAUSES OF DEATH.	DEATHS OF 1863.				DIED PER 1,000 OF THE STRENGTHS ABOVE STATED.				RATIO OF LIABILITY IN PERCENTAGES.				
	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	TOTAL.
Cholera	2	81	56	21	1·49	4·91	3·68	2·50	11·84	39·03	29·25	19·88	100
Fevers	3	62	46	27	2·25	3·76	3·02	3·21	18·38	30·72	24·67	26·23	100
Heat Apoplexy	1	14	25	15	·75	·85	1·64	1·78	14·94	16·93	32·67	35·46	100
Delirium tremens	...	2	9	6	...	·12	·59	·71	...	8·45	41·55	50·00	100
Dysentery and Diarrhœa ...	2	45	68	36	1·49	2·73	4·47	4·28	11·49	21·05	34·46	33·00	100
Hepatitis	...	20	76	41	...	1·21	5·00	4·88	...	10·91	45·09	44·00	100
Phthisis pulmonalis ...	...	25	38	26	...	1·51	2·50	3·09	...	21·27	35·21	43·52	100
Heart diseases	...	5	12	14	...	·30	·80	1·67	...	10·83	28·88	60·29	100
All other causes	2	57	98	55	1·49	3·47	6·44	6·54	8·31	19·34	35·90	36·45	100
All causes	10	311	428	241	7·47	18·86	28·14	28·66	8·99	22·69	33·85	34·47	100
All causes, excluding Cholera ...	8	230	372	220	5·98	13·95	24·46	26·16	8·48	19·77	34·67	37·08	100

Distribution of the Strength of the Army according to Age at the beginning of 1864.

Total Strength.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.
					9,042	
41,661	1,008	15,349	16,262	6,185	2,453	404

Deaths of 1864, *and the Death-rates per* 1,000 *of the Strength at the different Ages.*

Causes of Death.	Deaths of 1864.				Died per 1,000 of the Strength above stated.				Ratio of Liability in Percentages.				
	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Total.
Cholera	4	28	44	20	3·97	1·82	2·71	2·21	37·07	17·00	25·30	20·63	100
Fevers	5	37	51	28	4·96	2·41	3·14	3·10	36·45	17·71	23·07	22·77	100
Heat Apoplexy	...	12	25	32	...	·78	1·54	3·54	...	13·31	26·28	60·41	100
Delirium tremens	...	...	4	14	...	...	·24	1·55	...	...	13·41	86·59	100
Dysentery and Diarrhœa	1	16	46	36	·99	1·04	2·83	3·98	11·20	11·77	32·01	45·02	100
Hepatitis	3	20	57	38	2·98	1·31	3·50	4·20	24·85	10·93	29·19	35·03	100
Phthisis pulmonalis	...	16	43	8	...	1·04	2·64	·88	...	22·81	57·89	19·30	100
Heart diseases	...	2	13	24	...	·13	·80	2·66	...	3·62	22·28	74·10	100
All other causes	1	43	99	69	·99	2·80	6·09	7·63	5·66	15·99	34·78	43·57	100
All causes	14	174	382	269	13·89	11·33	23·49	29·75	17·70	14·44	29·94	37·92	100
All causes, excluding Cholera ...	10	146	338	249	9·92	9·51	20·78	27·54	14·64	14·04	30·67	40·65	100

The ratio of liability indicated must in a few instances be looked at in relation to the actuals shown in the same table, having sometimes no real significance in cases which appear exceptional.

It may be well to note that occasionally a ratio of liability shows a remarkable excess and stands out prominently as an apparent exception in the harmony of the tables. Such ratios are generally the equivalent of single cases, as will be seen by reference to the actuals appended.

The results for the period 1865-70 shown in the aggregate for all causes and for the chief components of the death tables.

In the table showing the aggregates for the six years 1865-70,* all such minor sources of discrepancy are removed. The table may be accepted as showing almost in perfection, the normal ratios in which men are liable to die at the different ages. This table comes up to my ideal of a standard; and whether taken as a whole or in detail, I believe it to represent with accuracy the expectations which we may entertain when violently disturbing causes of mortality are not present. The following are the totals:—

Died per 1,000 *on the Average of the six years* 1865-70.

	(Excluding Cholera.)			
	Under 20.	20 to 24.	25 to 29.	30 and upwards.
	7·61	13·67	17·41	29·94
Ratio of liability ...	11·09	19·92	25·37	43·62

Fever is the special disease of the boys and the young men, in whom, however, the system is gradually prepared for the invasion of climatic disease. The men from 25 to 29 show ratios immensely increased in all diseases of deterioration; heart disease is five times as prevalent as in the former class, heat apoplexy is doubled, and the liability to hepatitis is on 17 to 30. Phthisis, too, is rapidly increasing; and the effects of drunkenness become visible in the tendency to die by delirium tremens, which is first developed at this period of life.

Distribution according to Age of the Army of the Bengal Presidency, 1865-70.

Aggregate Strength of the Six Years.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.
					62,162	
216,723	10,509	60,878	83,174	43,727	15,688	2,747

Number of Deaths, and the Ratios at the different Ages, 1865-70.

Causes of Death.	Deaths of 1865-70.				Died per 1,000 of the Strength above stated.				Ratio of Liability in Percentages.				
	Under 20.	20 to 24	25 to 29.	30 and upwards.	Under 20.	20 to 24	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Total.
Cholera ...	52	343	464	430	4·95	5·63	5·58	6·92	21·45	24·39	24·18	29·98	100
Fevers ...	47	291	221	185	4·48	4·78	2·66	2·98	30·07	32·08	17·85	20·00	100
Heat Apoplexy ...	10	75	194	274	·94	1·23	2·33	4·41	10·55	13·80	26·15	49·50	100
Delirium tremens ...	...	...	20	67	...	...	·24	1·08	...	...	18·18	81·82	100
Dysentery & Diarrhœa...	6	111	192	199	·57	1·82	2·31	3·20	7·21	23·04	29·24	40·51	100
Hepatitis ...	1	105	253	339	·09	1·73	3·04	5·45	·87	16·78	29·49	52·86	100
Phthisis pulmonalis ...	3	72	122	133	·29	1·18	1·47	2·14	5·71	23·23	28·94	42·12	100
Heart disease	2	11	77	179	·19	·18	·92	2·88	4·56	4·32	22·06	69·06	100
All other causes ...	11	167	369	485	1·05	2·75	4·44	7·80	6·55	17·14	27·68	48·63	100
All causes ...	132	1,175	1,912	2,291	12·56	19·30	22·99	36·86	13·70	21·04	25·07	40·19	100
All causes, excluding Cholera ...	80	832	1,448	1,861	7·61	13·67	17·41	29·94	11·09	19·92	25·37	43·62	100

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* For the annual details of the period, see table appended to this Section.

The ratios of mortality and invaliding in the old soldier, the man above 30, compared with those for the men between 25 and 29.

I have said that the soldier is old at thirty. The last two columns of the table show how terribly true is the fact. Diseases of deterioration, which were bad enough in the men between 25 and 29, rise in the old soldier to an enormous ratio; and the same is true of his invaliding.

Statement showing in percentages the liability of the soldier above 30 to die, as compared with the men aged from 25 to 29—derived from the table for 1865-70.

CAUSES OF DEATH.	25 to 29.	30 and upwards.	TOTAL.
Heat Apoplexy	34·57	65·43	100
Delirium tremens	18·18	81·82	100
Dysentery	41·92	58·08	100
Hepatitis	35·80	64·20	100
Phthisis pulmonalis	40·72	59·28	100
Heart diseases...	24·21	75·79	100
All other causes (excluding Fever and Cholera)	36·28	63·72	100
All causes (excluding Cholera) ...	36·77	63·23	100

If we look at the ratio of invaliding for the same period the same grand truth is brought out. The ratio of invaliding is consistently doubled in the case of the old soldier, when compared with that for men between 25 and 29.

Distribution according to Age of the Army of the Bengal Presidency, 1865 *to* 1870.

AGGREGATE OF THE SIX YEARS.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.
					62.162	
216,723	10,509	60,878	83.174	43,727	15,688	2.747

Number Invalided, and the ratios at the different Ages, 1865 *to* 1870.

YEAR.	NUMBERS INVALIDED AT THE DIFFERENT AGES.				INVALIDED PER 1,000 OF THE STRENGTHS ABOVE STATED.				RATIO OF LIABILITY IN PERCENTAGES.				
	20 and under.	21 to 24.	25 to 29.	30 and upwards.	20 and under.	21 to 24.	25 to 29.	30 and upwards.	20 and under.	21 to 24.	25 to 29.	30 and upwards.	TOTAL.
1865 ...	39	236	742	715	26·84	17·31	45·13	87·26	15·20	9·81	25·56	49·43	100·00
1866 ...	36	220	661	824	28·80	21·96	41·73	80·95	16·60	12·66	24·06	46·68	100·00
1867 ...	35	226	539	859	19·49	27·29	34·30	79·12	12·16	17·04	21·41	49·39	100·00
1868 ...	42	209	397	756	25·58	23·14	30·99	74·69	16·57	14·99	20·07	48·37	100·00
1869 ..	75	366	480	892	32·17	35·92	40·03	77·94	17·29	19·31	21·51	41·89	100·00
1870 ..	46	365	486	824	22·58	37·53	46·84	72·50	12·58	20·92	26·10	40·40	100·00
SIX YEARS...	273	1,622	3.305	4,870	25·98	26·64	39·74	78·34	15·22	15·61	23·28	45·89	100·00

Ratio of Invaliding in men above 30, *compared with that for men between* 25 *and* 29.

YEAR.		INVALIDED PER 1,000.		RATIO OF LIABILITY.		
		25 to 29.	30 and upwards.	25 to 29.	30 and upwards.	TOTAL.
1865	...	45·13	87·26	34·09	65·91	100
1866	...	41·73	80·95	34·02	65·98	100
1867	...	34·30	79·12	30·24	69·76	100
1868	...	30·99	74·69	29·32	70·68	100
1869	...	40·03	77·94	33·93	66·07	100
1870	...	46·84	72·54	39·25	60·75	100
1865-70	...	39·74	78·34	33·66	66·34	100

The old soldiers make up as usual the bulk of the invaliding, but the invaliding-rate for young men has largely increased in 1869 and 1870.

What body is it, then, which contributes chiefly to determine the standard of invaliding reached of late years? Not the boys nor the young men, a body of equal strength with the men above 30. The invaliding of the young is but one-third of what it is in men above 30; for of 4,870 invalids aged above 30, who went home in these six years, there were but 1,622 aged from 21 to 24. I am quite prepared to admit, however, that the invaliding in young regiments and among recruits is high, and the table shows that in the two last years the ratio has seriously increased.

The composition of the army as regards the relative number of very young men has certainly tended to increase this invaliding, and the fact is one well to be weighed that its significance may be rightly interpreted. The increase of the ratio in 1869-70 among the young men, means, that the numbers new to India have been large, and that the climatic diseases to which the young are specially liable have been epidemically prevalent:—

Invaliding-rate per 1,000 *for young men from* 21 *to* 24, 1865-70.

1865.	1866.	1867.	1868.	1869.	1870.	1865—70.
17·31	21·96	27·29	23·14	35·92	37·53	26·04

Death and invaliding of boys at the age of 20, who are supposed to hold a place intermediate between the first and second classes.

It has been alleged that both as regards death and invaliding, the ratios for young boys under 20 are apt to be understated, chiefly by the fact of boys who come to India below 20 being removed into the next class before the end of their first year of service, so that while their strengths appear as on landing, the death or invaliding is recorded among the men aged from 20 upwards. I do not believe that this objection has much weight, but I have in this table of invaliding thrown the boys of the age of 20 into the lower class, retaining the strength as before. This should tell adversely on the ratio for the young boys; but as it stands, it is certainly not inferior to that of the two higher classes, which represents the soldier at his best. I have thought it also worth while to select from the death-rolls of these six years the deaths of boys at the age of 20, which ought perhaps to be divided between the lowest and the second class, and I place it here as affording an additional illustration of the causes by which the death of the young soldier is brought about:—

Deaths at the Age of 20, 1865-70.

CAUSES OF DEATH.		1865.	1866.	1867.	1868.	1869.	1870.	Deaths at 20, six years, 1865-70.	Deaths at 20 in Regiments in the first year, 1864-69.
Cholera	...	3	1	25	2	20	...	51	18
Continued Fever	...	5	11	5	10	22	13	66	17
Heat Apoplexy	...	1	1	1	5	5	6	19	5
Dysentery	...	1	3	1	1	3	1	10	4
Hepatitis	...	...	...	1	1	...	2	4	...
Phthisis	...	1	...	1	1	4	3	10	2
Bronchitis & Pneumonia		...	1	...	...	...	1	2	1
Heart disease	...	...	2	...	...	...	...	2	...
Other diseases	...	...	1	...	1	2	1	5	...
Accident	...	...	1	...	1	1	2	5	2
Suicide	...	...	...	...	...	2	1	3	...
Suffocated while drunk		...	1	...	...	...	...	1	...
		11	22	34	22	59	30	178	49

The proportion of men above 30 has increased year by year from 1865 to 1870, while the most efficient class, the men from 20 to 30, has diminished; and this being the case, we may expect the invaliding-rate to rise relative to the increase of old soldiers.

When we look to the excessive invaliding-rates of the old soldier, we naturally ask whether the increase of the rates of late years has not been in a great measure due to the fact, that the army has as a body been getting older year by year, and thus furnishing a larger body affording the maximum invaliding ratio. The following table will, I think, suggest that such has been the case. It shows that the number of really efficient men of the army, those from 20 to 30, has year by year been decreasing, by men passing into the older grade. While in 1863 we had 76·48 per cent. of the army composed of men between 20 and 30, in 1870 the proportion was 60·00 per cent. only. The proportion of this, the best material, has been steadily decreasing year by year :—

Statement showing the decrease year by year of the number of men between 20 *and* 30, *who constitute the most efficient body for service in India, and the steady increase in men above* 30.

Men from 20 *to* 30, *per cent. of the Total Strength of the Army.*

1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.
76·48	75·88	75·71	69·35	65·48	65·00	61·69	60·00

And the ratio of the men above 30 has been rising steadily in like proportion :—

Men above 30, *per cent. of the Total Strength of the Army.*

1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.
20·29	21·70	20·63	27·30	29·62	30·11	31·83	33·92

In the earlier years of the period, the proportion of old men was one-fifth, in 1869 and 1870 the proportion was one-third, and this third of the army is a body which consistently gives an invaliding ratio of nearly 8 per cent.

Army of the Bengal Presidency, 1863-70. *Composition of the strength at the different ages in each year, showing how the young and the old components have increased, while the most efficient body has progressively diminished in strength.*

AGE.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.
Under 20	3·23	2·42	3·66	3·35	4·90	4·89	6·48	6·08
20 to 24	39·79	36·84	34·32	26·87	22·59	26·88	28·34	29·03
25 to 29	36·69	39·04	41·39	42·48	42·89	38·12	33·35	30·97
30 and upwards	20·29	21·70	20·63	27·30	29·62	30·11	31·83	33·92
TOTAL ...	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

In contrast to the ratio for the army as a whole for the period 1865-70, I shall now show how age affects the men of newly-arrived regiments as regards their death and invaliding:—

Distribution of the Strength of Regiments in their First Year of Indian Service according to Age, 1864-69.

Strength on Arrival.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.
					2,931	
14,802	2,088	5,790	3,993	2,067	751	113

Causes of Deaths in the First Year of Service, and the Death-rates at the different Ages.

Causes of Death.	Number of Deaths.				Died per 1,000 of the Strengths above stated.				Ratio of Liability in Percentages.				
	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Total.
Cholera	20	92	67	60	9·58	15·89	16·78	20·47	15·28	25·33	26·75	32·64	100
Fevers	14	60	34	11	6·70	10·36	8·52	3·75	22·84	35·32	29·05	12·79	100
Apoplexy	5	22	40	51	2·40	3·80	10·02	17·40	7·14	11·30	29·80	51·76	100
Delirium tremens	...	...	3	5	...	...	·75	1·71	...	...	30·49	69·51	100
Dysentery and Diarrhœa ...	3	19	22	16	1·44	3·28	5·51	5·46	9·18	20·90	35·12	34·80	100
Hepatitis	...	11	19	20	...	1·90	4·75	6·82	...	14·11	35·26	50·63	100
Phthisis pulmonalis ...	...	15	15	7	...	2·59	3·76	2·39	...	29·63	43·02	27·35	100
Heart diseases	1	...	7	3	·48	...	1·75	1·02	14·77	...	53·85	31·38	100
All other causes	4	17	17	25	1·91	2·94	4·26	8·53	10·83	16·67	24·15	48·35	100
All Causes	47	236	224	198	22·51	40·76	56·10	67·55	12·04	21·81	30·01	36·14	100
All Causes, excluding Cholera	27	144	157	138	12·93	24·87	39·32	47·08	10·41	20·02	31·66	37·91	100

Distribution according to Age of the Strength of Regiments in their Second Year of Indian Service, 1865-70.

Strength at beginning of Second Year.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.
					3,061	
14,643	1.518	5.558	4,506	2,146	788	127

Causes of Deaths in the Second Year of Service, and the Death-rates at the different Ages.

Causes of Death.	Number of Deaths.				Died per 1,000 of the Strengths above stated.				Ratio of Liability in Percentages.				
	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Total.
Cholera	1	12	20	15	·66	2·16	4·44	4·90	5·43	17·76	36·51	40·30	100·00
Fevers	3	32	26	14	1·97	5·76	5·77	4·57	10·90	31·88	31·93	25·29	100·00
Heat Apoplexy	...	6	12	11	...	1·08	2·66	3·60	...	14·71	36·24	49·05	100·00
Delirium tremens	...	...	3	3	...	...	·67	·98	...	...	40·61	59·39	100·00
Dysentery and Diarrhœa	2	7	12		1·32	1·26	2·66	4·57	13·45	12·84	27·12	46·59	100·00
Hepatitis	...	8	19	21	...	1·44	4·22	6·86	...	11·50	33·71	54·79	100·00
Phthisis pulmonalis	...	14	10	7	...	2·52	2·22	2·29	...	35·85	31·58	32·57	100·00
Heart diseases	...	2	2	14	...	·36	·44	4·57	...	6·71	8·19	85·10	100·00
All other causes	1	19	20	25	·66	3·42	4·44	8·17	3·96	20·49	26·60	48·95	100·00
All Causes	7	100	124	124	4·61	18·00	27·52	40·51	5·09	19·86	30·36	44·69	100·00
All Causes, excluding Cholera ...	6	88	104	109	3·95	15·84	23·08	35·61	5·03	20·18	29·41	45·38	100·00

The death-rate at different ages in newly-arrived regiments. The rate increases steadily with age.

The fact that men of newly-arrived regiments die in a much higher ratio than the army in general has been clearly exhibited. The same is true for the men of all ages :—

Death-rate per 1,000 *at the different Ages. Average for the Army,* 1865-70, *and for newly-arrived Regiments,* 1864-69.

	(Excluding Cholera.)			
	Under 20.	20 to 24.	25 to 29.	30 and upwards.
Army of 1865-70	7·61	13·67	17·41	29·94
New Regiments, 1864-69 ...	12·93	24·87	39·32	47·08

Decreases in the second year at all ages. But the relative liability to death at the different ages continues, and progresses towards the standard.

In the second year, the diminution which takes place in the death-rate is shown also in the case of each class :—

Death-rates in the First and Second Years of Indian Service contrasted at the different Ages.

	(Excluding Cholera.)			
	Under 20.	20 to 24.	25 to 29.	30 and upwards.
First year	12·93	24·87	39·32	47·08
Second year	3·95	15·84	23·08	35·61

But while the death-rates diminish so remarkably, the relative liability to death at the different ages is not much altered, and in the ratios for the second year of residence, we find it fast running towards the standard :—

Comparative liability to death at different ages contrasted in the case of the newly-arrived and the Army as a body.

	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Total.
Standard, 1865-70 ...	11·09	19·92	25·37	43·62	100
Regiments in second year	5·03	20·18	29·41	45·38	100
Regiments in first year ...	10·41	20 02	31·66	37·91	100

Looking at the columns showing the composition of the death-rate in the first year, we have no difficulty in recognising that the young material is that best qualified to stand the climate of India. It is not that the young do not suffer in an equal degree from the diseases of the unacclimatised with the older men. But the young constitution possesses the power of resiliency; and while the older man dies, the younger recovers, and is not necessarily damaged for Indian Service by the fact that he has suffered from serious illness in his first year of residence.

Distribution according to Age of the Strength of Regiments in their First Year of Indian Service, 1864-69.

STRENGTH ON ARRIVAL.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.
					2,931	
14,802	2,088	5,790	3,993	2,067	751	113

Causes of Invaliding in the First Year of Service, and the Invaliding-rates at the different Ages.

CAUSES OF INVALIDING.	NUMBER INVALIDED.				INVALIDED PER 1,000 OF THE STRENGTHS ABOVE STATED.				RATIO OF LIABILITY IN PERCENTAGES.				
	20 and under.	21 to 24.	25 to 29.	30 and upwards	20 and under.	21 to 24.	25 to 29.	30 and upwards.	20 and under.	21 to 24.	25 to 29.	30 and upwards.	TOTAL.
Fevers	4	6	6	8	1·91	1·04	1·50	2·73	26·60	14·49	20·89	38·02	100
Dysentery and Diarrhœa ...	9	11	14	14	4·31	1·90	3·51	4·78	29·72	13·10	24·21	32·97	100
Hepatitis	9	12	18	10	4·31	2·07	4·51	3·41	30·14	14·47	31·54	23·85	100
Phthisis pulmonalis ...	12	40	31	12	5·75	6·91	7·76	4·09	23·46	28·19	31·66	16·69	100
Heart disease	7	4	16	6	3·35	·69	4·01	2·05	33·17	6·83	39·70	20·30	100
Mania and Epilepsy ...	4	7	10	5	1·91	1·21	2·50	1·71	26·06	16·51	34·10	23·33	100
Cephalæa*	2	6	3	7	·96	1·04	·75	2·39	18·68	20·23	14·59	46·50	100
Debility (due to disease) ...	2	3	4	7	·96	·52	1·00	2·39	19·71	10·68	20·53	49·08	100
Rheumatism	...	7	11	7	...	1·21	2·75	2·39	...	19·05	43·31	37·64	100
Syphilis	2	7	13	3	·96	1·21	3·26	1·02	14·88	18·76	50·54	15·82	100
All other causes	6	9	16	28	2·88	1·55	4·01	9·55	16·01	8·62	22·29	53·08	100
ALL CAUSES ...	57†	112	142	107	27·30†	19·35	35·56	36·51	23·00†	16·30	29·95	30·75	100

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* Generally the result of fever or heat apoplexy.

† The men whose ages are returned as 20 are included in the youngest group. The ratio per 1,000 of strength must be regarded as approximate only, since the strength on arrival is given for men below 20.

Distribution according to Age of the Strength of Regiments in their Second Year of Indian Service, 1865-70.

STRENGTH AT BEGINNING OF SECOND YEAR.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.
					3.061	
14,643	1,518	5,558	4,506	2,146	788	127

Causes of Invaliding in the Second Year of Service, and the Invaliding-rates at the different Ages.

CAUSES OF INVALIDING.	NUMBER INVALIDED.				INVALIDED PER 1,000 OF THE STRENGTH ABOVE STATED.				RATIO OF LIABILITY IN PERCENTAGES.				
	20 and under.	21 to 24.	25 to 29.	30 and upwards.	20 and under.	21 to 24.	25 to 29.	30 and upwards.	20 and under.	21 to 24.	25 to 29.	30 and upwards.	TOTAL.
Fevers	3	18	7	12	1·97	3·24	1·55	3·92	18·45	30·34	14·51	36·70	100
Dysentery and Diarrhœa	5	17	20	11	3·29	3·06	4·44	3·60	22·86	21·27	30·85	25·02	100
Hepatitis	1	42	30	48	·66	7·55	6·66	15·68	2·16	24·71	21·80	51·33	100
Phthisis pulmonalis	4	23	32	24	2·64	4·14	7·10	7·84	12·15	19·06	32·70	36·09	100
Heart disease	12	36	27	13	7·91	6·48	6·00	4·25	32·10	26·30	24·35	17·25	100
Mania and Epilepsy	2	6	7	4	1·32	1·08	1·55	1·31	25·10	20·53	29·47	24·90	100
Cephalæa	...	1	2	2	...	·18	·44	·65	...	14·17	34·65	51·18	100
Debility (due to disease)	13	32	18	35	8·56	5·75	4·00	11·43	28·78	19·34	13·45	38·43	100
Rheumatism	1	7	11	20	·66	1·26	2·44	6·53	6·06	11·57	22·41	59·96	100
Syphilis	...	7	16	6	...	1·26	3·55	1·96	...	18·61	52·44	28·95	100
All other causes	8	43	38	53	5·27	7·74	8·43	17·32	13·60	19·97	21·75	44·68	100
ALL CAUSES ...	49	232	208	228	32·28	41·74	46·16	74·49	16·58	21·44	23·71	38·27	100

The invaliding-rate is, generally speaking, low at all ages in the first year, excessive at all ages in the second year, and approaches the standard, except in the case of the old men, in the third year of service.

I have shown how in the third year of residence the invaliding-ratio very nearly approaches, even in its details, the ratio for the army as a body. At the younger ages the disparity from the standard is not great; but a ratio of 96 per 1,000 for the men above 30 shows how quickly the old soldier new to India becomes inefficient from diseases of deterioration. When divided off according to age, the ratios in the second year of residence stand much above the average of the six years 1865-70; it seems, indeed, as if the invaliding of the second year included the men who escaped going home at the close of the first year, as well as the ratio normal for the year itself. The ratios for the first year of residence are lower at all ages, but this is what might have been expected. In the first year disease falls sharply on the newly-arrived, but the elasticity of the system counterbalances the effect of the shock, and during the cold season the constitution is placed in conditions so favourable that the necessity for change to Europe is avoided.

Antagonism between the invaliding and deaths from heart disease in newly-arrived regiments in relation to age.

Perhaps the most extraordinary feature in the invaliding tables for the first and second years of residence is the ratio for heart disease. The table for men in the second year suggests, that the liability to this great cause of invaliding is least in old soldiers and highest among the young boys, ranging thus:—

20 and under.	21 to 24.	25 to 29.	30 and upwards.	TOTAL.
32·10	26·30	24·35	17·25	100

Out of a strength, below 24, of 7,076, we find 48 invalided for heart disease; and out of 7,567, of 25 and upwards, 40 only. This is in direct contradiction to the death tables. The tables for the period 1865 to 1870 show, that in these years 13 men only below 24 died; while, in the same period, 256 men of 25 and above, died from heart disease. And, again, the tables showing the deaths in the first and second years of residence repeat the same as regards the mortality from heart disease; 3 men only below 24 died, against 26 who died at the late period of life. There is a curious problem, involving the etiology of heart disease, contained in this remarkable antagonism between the relation of the ratios of death and invaliding to age. It seems as if the anæmia of the young, developed under climatic influence, very rapidly determines the tendency to functional disease of the heart, which, again, lays the foundation of the organic disease so extensively developed in old soldiers, as the very large number of deaths from valvular disease and aortic aneurism which occur in every year testifies.

*Distribution according to Age of the Strength of Regiments in their Third Year of Indian Service, 1866-70.**

STRENGTH AT BEGINNING OF THIRD YEAR.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.
					3,018	
13,339	811	5,266	4,244	2,031	848	139

Causes of Invaliding in the Third Year of Service, and the Invaliding-rates at the different Ages.

CAUSES OF INVALIDING.	NUMBER INVALIDED.				INVALIDED PER 1,000 OF STRENGTH.				RATIO OF LIABILITY IN PERCENTAGES.				
	20 and under.	21 to 24.	25 to 29.	30 and upwards.	20 and under.	21 to 24.	25 to 29.	30 and upwards.	20 and under.	21 to 24.	25 to 29.	30 and upwards.	TOTAL.
Fevers ...	2	6	12	12	2·47	1·14	2·83	3·98	23·70	10·94	27·16	38·20	100
Dysentery and Diarrhœa ...	1	9	11	6	1·23	1·71	2·59	1·99	16·36	22·74	34·45	26·45	100
Hepatitis ...	2	19	28	41	2·47	3·61	6·60	13·58	9·41	13·75	25·13	51·71	100
Phthisis pulmonalis ...	3	14	15	15	3·70	2·66	3·53	4·97	24·90	17·90	23·75	33·45	100
Heart disease and Palpitation ...	4	16	17	21	4·93	3·04	4·01	6·96	26·03	16·05	21·17	36·75	100
Mania ...	...	1	5	12	...	·19	1·18	3·98	...	3·55	22·06	74·39	100
Debility ...	6	21	27	54	7·40	3·99	6·36	17·89	20·76	11·20	17·85	50·19	100
Rheumatism ...	1	4	16	46	1·23	·76	3·77	15·24	5·86	3·62	17·95	72·57	100
Syphilis ...	...	10	12	18	...	1·90	2·83	5·96	...	17·77	26·47	55·76	100
All other causes ...	6	29	41	64	7·40	5·50	9·66	21·21	16·91	12·56	22·07	48·46	100
ALL CAUSES ...	25	120	184	289	30·83	24·50	43·36	95·76	15·85	12·60	22·30	49·25	100

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* The strength of the 62nd and 1-14th Regiments, which are now in their third year, is struck off.

Characteristics of the invaliding of the third year of service.

I have arranged in a parallel form, the invaliding of the third year of Indian Service also. The 1-14th and 62nd Regiments, which are now in the third year, are necessarily omitted in this tabulation. This table demonstrates strikingly the fact, that it is the old men who are chiefly lost as Indian service increases; for in this third year no less than 96 per 1,000 of men above 30 were removed by invaliding. In short, the body composing the force three years in India was decimated by the invaliding of this single year.

It is better to leave out of view the invaliding for boys under 20, and to view all under 24 as one group; and the more so, because the aspect of the statistics of the two young groups has been damaged by the endeavour to class lads of 20 with boys, without making an adequate addition to the strength of the group.

In the third year the standard normal for the different ages seems to be attained. As I have said, in the first year the difference in the ratio for the classes is not very great, although the ratio is necessarily heavier for the old man than for the younger. In the second year, the rate for the young is much above what it should be when compared with that of the next class; but young men suffer heavily from invaliding in the second year, from damage to the system during the carrying out of the process of adaptation of the constitution to the climate of India. Even in the second year, however, the ratio for old men is nearly double what it is in the young; and this is to be remarked, that while the ratio for the young men comes down in the third year and settles at a minimum, the loss among the old is rapidly progressive, showing that there is no adaptation to the Indian climate of the system of the old soldier :—

Invaliding per 1,000 *in the first three years of Indian Service at different Ages, as compared with the standard.*

	YOUNG SOLDIERS.	MATURE SOLDIERS.	OLD SOLDIERS.
	24 and under.	25 to 29.	30 and upwards.
Standard of 1865-70 ..	26·55	39·74	78·34
Third year ...	25·36	43·36	95·76
Second year ...	39·71	46·16	74·49
First year ...	21·45	35·56	36·51

While it is true that the old men have suffered, and will continue to suffer, the truth is not to be disguised, that the invaliding of young men under 24 has been far above the normal average, chiefly owing to the loss of the second year. Out of 1,762 men lost by invaliding in the first three years of Indian service, 604 were below 25, 534 from 25 to 29, and 624 above 30 years of age.

Loss by death and invaliding in new Regiments in the first three years of service.

It is a very serious subject for reflection that this body whose statistics we have been considering, numbering under 15,000, should in three years have lost by death upwards of 1,300, and by invaliding upwards of 1,800 of its strength* :—

Table showing the Strength of the Army of Bengal at the different periods of Indian Service, between 1865 *and* 1870, *and the ratio of Invaliding in relation to the number of years of residence in India.*

(AN APPROXIMATE STATEMENT).

SERVICE IN INDIA.	STRENGTH IN EACH YEAR AT THE DIFFERENT PERIODS OF SERVICE.						TOTAL AT EACH PERIOD.	INVALIDED PER 1,000.	
	1865.	1866.	1867.	1868.	1869.	1870.		Army of Bengal, 1865-70.	New Regiments, 1864-70.
Under 1 year ...	3,596	4,785	1,504	6,467	6,550	4,710	27,612	38·53	38·54
1 to 2 years ...	3,721	4,008	4,818	4,111	7,115	4,646	28,419		
2 to 3 „ ...	3,100	4,212	3,689	3,208	3,613	5,747	23,569	40·86	46·74
3 to 4 „ ...	2,863	2,535	3,842	3,507	3,043	3,552	19,342	45·29	...
4 to 5 „ ...	3,759	2,373	2,472	2,190	3,036	2,836	16,666	45·06	...
5 to 6 „ ...	3,838	3,094	2,479	2,176	3,319	3,214	18,120	44·92	...
6 to 7 „ ...	5,973	4,105	3,472	1,909	2,416	2,688	20,563	44·94	...
Above 7 „ ...	12,800	12.175	14,371	10,041	6,864	6,109	62,360	57·65	...
TOTAL OF EACH YEAR	39,650	37,287	36,647	33,609	35,956	33,502	216,651	46·17	...

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* The regiments have, of course, been recruited; I speak of a body whose average strength approximates to 15,000.

The invaliding of the Regiments in the first three years of service has been, with trifling exceptions, of men from one to three years in India.

And in case it should be objected that the old soldiers who have volunteered from regiments going home from India may have contributed largely to the loss by invaliding of young regiments, I append the following statement, which shows that 100 only, out of the 1,800 invalids, were men who had served beyond three years in India :—

Statement showing the Number of Soldiers who had served upwards of three years in India, invalided from Regiments in their first three years of Indian Service.

Regiment.	1864.	1865.	1866.	Total.
5th Lancers	...	1	3	4
36th Regiment	...	1	1	2
55th "	...	3	...	3
	1865.	1866.	1867.	
1-11th Regiment	...	...	6	6
2-12th "	...	3	4	7
58th "	1	6	...	7
A. Brigade, D. Battery, R. H. Art.	...	...	...	...
A. " E. " "	...	1	...	1
	1866.	1867.	1868.	
A. Brigade, A. Battery, R. H. Art.	...	...	1	1
A. " B. " "	...	...	...	...
A. " C. " "	...	...	...	...
41st Regiment	2	1	7	10
	1867.	1868.	1869.	
8th Brigade, B. Battery, R. Art.	...	...	...	...
8th " C. " "	...	...	...	...
8th " D. " "	1	...	...	1
1-3rd Regiment	1	...	1	2
1-5th "	1	3	5	9
37th "	1	...	7	8
	1868.	1869.	1870.	
8th Brigade, E. Battery, R. Art.	...	...	1	1
8th " F. " "	...	...	1	1
8th " G. " "	...	...	...	...
8th " H. " "	...	...	2	2
4th Hussars	...	...	4	4
1-6th Regiment	...	1	10	11
2-60th "	...	...	...	...
85th "	...	...	3	3
92nd "	1	1	13	15
	1869.	1870.		
1-14th Regiment	...	...	...	...
62nd "	1	1	...	2
Total ...	...	...	...	100

Loss of the Army in general by invaliding at different periods of Indian Service.

How serious is the import of this loss is further shown in the Table annexed, which shows how the extent of invaliding is affected by length of residence in India. This statement shows, that out of a total of 10,002—the loss from 1865 to 1870—3,122 men were invalided who spent from one to three years only in India. The strength available for the calculation of ratios is carried up to seven years only; but it is remarkable to find that for the years from the fourth to the seventh the ratio of invaliding is almost identical, which indicates probably that at this period of service the army is at its best, sustaining year by year a loss which is not, on the one hand, exaggerated by the want of adaptation in the material new to the country, nor, on the other, by the effects of too prolonged exposure to tropical influences :—

Table showing the extent of Invaliding in relation to Length of Service in India.

YEARS IN INDIA.	Aggregate of the six years.	INVALIDED IN EACH YEAR. 1865.	1866.	1867.	1868.	1869.	1870.	Invalided per 1,000 of Strength.
1 year and under	995	184	149	127	164	222	149	38·53
2 years	1,164	119	207	129	135	351	223	
3 "	963	70	86	170	154	196	287	40·86
4 "	796	95	91	145	135	181	149	45·29
5 "	751	132	79	111	124	164	141	45·06
6 "	814	239	187	55	71	109	153	44·92
7 "	924	386	178	144	48	50	118	44·94
8 "	867	213	282	176	102	47	47	57·65
			279	251	107	115	43	
				160	106	97	63	
					108	98	73	
						87	101	
							75	
9 "	811	16						
10 "	469	21	22					
11 "	331	28	11	13				
12 "	289	20	44	25	12			
13 "	130	9	10	15	10	11		
14 "	93	14	12	22	18	13	14	
15 "	86	20	7	12	13	17	17	
16 "	93	26	10	16	17	13	11	
17 "	118	30	33	16	19	10	10	
18 "	134	26	30	42	22	4	10	
19 "	86	18	20	14	24	9	1	
20 "	43	10	12	6	6	8	1	
21 "	18	4	1	2	5	4	2	
22 "	11	2	...	1	2	3	3	
23 "	6	...	1	...	...	3	2	
24 "	5	1	1	...	1	1	1	
25 "	2	1	...	...	...	1	...	
26 "	1	1	...	...	...	...	...	
27 "	1	...	...	...	1	...	...	
28 "	1	...	...	...	1	...	...	
29 "	...	...	...	...	...	...	...	
30 "	...	...	...	...	...	...	...	
TOTAL ...	10,002	1,685	1,752	1,652	1,405	1,814	1,694	46·17

NOTE.—The space dividing the Table indicates the division between the old army and the new army of 1857-58, which was thirteen years old, as regards Indian Service, in 1870.

Is it a matter of necessity that young regiments should suffer this great damage in the early years of residence? This is a question of the gravest moment, and the laws determining disease in the young and unacclimatised demand our most earnest study.

Deaths of the Army from the chief causes of Mortality in each year from 1865 *to* 1870, *shown in relation to Age:*

DISTRIBUTION ACCORDING TO AGE OF THE ARMY OF THE BENGAL PRESIDENCY, 1865-70.

YEAR.	Total.	Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.	TOTAL ABOVE 30.
1865 ...	39,722	1,453	13,633	16,442	5,755	2,023	416	8,194
1866 ...	37,287	1,250	10,019	15,839	6,899	2,864	416	10,179
1867 ...	36,647	1,796	8,280	15,714	7,634	2,752	471	10,857
1868 ...	33,609	1,642	9,033	12,812	7,127	2,470	525	10,122
1869 ...	35,956	2,331	10,188	11,992	8,290	2,731	424	11,445
1870 ...	33,502	2,037	9,725	10,375	8,022	2,848	495	11,365
Aggregate of the six years ...	216,723	10,509	60,878	83,174	43,727	15,688	2,747	62,162
					62,162			

Deaths of the Army from the chief causes of Mortality in each

Causes of Death.	Year.	Deaths of 1865-70.				Died per 1,000.				Ratio of Liability in percentages.				
		Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Total.
Cholera ...	1865 ...	3	27	59	29	2·07	1·98	3·59	3·54	18·52	17·71	32·11	31·66	100
	1866 ...	...	10	22	13	...	1·00	1·39	1·28	...	27·25	37·87	34·88	100
	1867 ...	23	131	183	141	12·81	15·82	11·65	12·99	24·05	29·70	21·87	24·38	100
	1868 ...	7	11	18	21	4·26	1·22	1·41	2·07	47·54	13·62	15·74	23·10	100
	1869 ...	18	158	175	219	7·72	15·51	14·59	19·14	13·55	27·23	25·62	33·60	100
	1870 ...	1	6	7	7	·49	·62	·67	·61	20·50	25·95	28·03	25·52	100
	1865—70	52	343	404	430	4·95	5·63	5·58	6·92	21·45	24·39	24·18	29·98	100
Fevers ...	1865 ...	7	47	61	23	4·82	3·45	3·71	2·81	32·59	23·33	25·08	19·00	100
	1866 ...	1	36	39	37	·80	3·59	2·46	3·63	7·63	34·26	23·47	34·64	100
	1867 ...	3	29	25	37	1·67	3·50	1·59	3·41	16·42	34·42	15·63	33·53	100
	1868 ...	10	41	25	15	6·09	4·54	1·95	1·48	43·31	32·29	13·87	10·53	100
	1869 ...	11	75	39	41	4·72	7·30	3·25	3·58	24·96	38·92	17·19	18·93	100
	1870 ...	15	63	32	32	7·37	6·48	3·09	2·82	37·30	32·79	15·64	14·27	100
	1865—70	47	291	221	185	4·48	4·78	2·66	2·98	30·07	32·08	17·85	20·00	100
Apoplexy ...	1865 ...	...	11	53	59	...	·81	3·22	7·20	...	7·21	28·67	64·12	100
	1866 ...	2	5	28	27	1·60	·50	1·77	2·65	24·54	7·67	27·15	40·64	100
	1867 ...	1	14	31	43	·55	1·69	1·97	3·96	6·73	20·69	24·11	48·47	100
	1868 ...	3	13	33	43	1·83	1·44	2·58	4·25	18·12	14·26	25·54	42·08	100
	1869 ...	4	21	39	69	1·71	2·06	3·25	6·03	13·10	15·79	24·90	46·21	100
	1870 ...	...	11	10	33	...	1·13	·96	2·90	...	22·64	19·24	58·12	100
	1865—70	10	75	194	274	·94	1·23	2·33	4·41	10·55	13·80	26·15	49·50	100
Delirium Tremens	1865 ...	...	...	6	11	...	...	·36	1·31	...	...	20·00	80·00	100
	1866 ...	...	...	1	13	...	...	·07	1·28	...	...	5·18	94·82	100
	1867 ...	...	...	3	11	...	...	·19	1·01	...	...	15·83	84·17	100
	1868 ...	...	...	4	8	...	...	·31	·79	...	...	28·18	71·82	100
	1869 ...	...	...	4	17	...	...	·34	1·49	...	...	18·58	81·42	100
	1870 ...	...	...	2	7	...	...	·19	·61	...	...	23·75	76·25	100
	1865—70	...	...	20	67	...	...	·24	1·08	...	...	18·18	81·82	100
Dysentery and Diarrhœa ...	1865 ...	1	21	55	31	·69	1·54	3·34	3·78	7·38	16·47	35·72	40·43	100
	1866 ...	1	12	31	30	·80	1·20	1·96	2·95	11·58	17·37	28·36	42·69	100
	1867 ...	...	10	36	37	...	1·21	2·29	3·41	...	17·51	33·14	49·35	100
	1868 ...	3	13	21	17	1·83	1·44	1·64	1·68	27·77	21·85	24·88	25·50	100
	1869 ...	1	38	36	47	·43	3·73	3·00	4·11	3·82	33·09	26·62	36·47	100
	1870 ...	...	17	13	37	...	1·75	1·25	3·26	...	27·95	19·97	52·08	100
	1865—70	6	111	192	199	·57	1·82	2·31	3·20	7·21	23·04	29·24	40·51	100
Hepatitis ...	1865 ...	...	16	57	46	...	1·18	3·47	5·61	...	11·50	33·82	54·68	100
	1866 ...	...	11	45	35	...	1·10	2·84	3·44	...	14·91	38·48	46·61	100
	1867 ...	...	7	36	47	...	·85	2·29	4·33	...	11·38	30·66	57·96	100
	1868 ...	...	20	38	50	...	2·21	2·96	4·94	...	21·86	29·28	48·86	100
	1869 ...	1	29	46	95	·43	2·85	3·84	8·30	2·79	18·48	24·90	53·83	100
	1870 ...	...	22	31	66	...	2·26	2·99	5·81	...	20·43	27·04	52·53	100
	1865—70	1	105	253	339	·09	1·73	3·04	5·45	·87	16·78	29·49	52·86	100
Phthisis ...	1865 ...	...	12	27	15	...	·88	1·64	1·83	...	20·23	37·70	42·07	100
	1866 ...	...	10	20	18	...	1·00	1·83	1·77	...	21·74	39·78	38·48	100
	1867 ...	...	11	19	18	...	1·33	1·21	1·66	...	31·67	28·81	39·52	100
	1868 ...	1	11	18	19	·61	1·22	1·41	1·88	11·91	23·83	27·54	36·72	100
	1869 ...	1	20	15	37	·43	1·96	1·25	3·23	6·26	28·53	18·19	47·02	100
	1870 ...	1	8	14	26	·49	·82	1·35	2·29	9·90	16·57	27·27	46·26	100
	1865-70...	3	72	122	133	·29	1·18	1·47	2·14	5·71	23·23	28·94	42·12	100

From 1865 *to* 1870, *shown in relation to Age,*—continued.

ES OF DEATH.	YEAR.	DEATHS OF 1865-70.				DIED PER 1,000.				RATIO OF LIABILITY IN PERCENTAGES.				
		Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	Under 20.	20 to 24.	25 to 29.	30 and upwards.	TOTAL.
DISEASES ...	1865 ...	1	1	15	23	·69*	·07	·91	2·81	15·40*	1·56	20·31	62·73	100
	1866 ...	...	8	10	26	...	·80	·63	2·55	...	20·10	15·83	64·07	100
	1867 ...	...	1	17	23	...	·12	1·08	2·12	...	3·61	32·53	63·86	100
	1868 ...	1	1	12	28	·61*	·11	·94	2·77	13·77*	2·48	21·22	62·53	100
	1869 ...	...	...	12	41	...	...	1·00	3·58	...	...	21·83	78·17	100
	1870 ...	...	...	11	38	...	...	1·06	3·34	...	...	24·09	75·91	100
	1865-70...	2	11	77	179	·19	·18	·92	2·88	4·56	4·32	22·06	69·06	100
OTHER CAUSES	1865 ...	...	33	74	77	...	2·42	4·50	9·40	...	14·83	27·57	57·60	100
	1866 ...	2	26	80	79	1·60	2·59	5·05	7·76	9·41	15·23	29·71	45·65	100
	1867 ...	3	16	56	69	1·67	1·93	3·57	6·35	12·35	14·28	26·41	46·96	100
	1868 ...	2	23	39	66	1·22	2·54	3·04	6·52	9·16	19·07	22·82	48·95	100
	1869 ...	3	32	55	88	1·29	3·14	4·59	7·69	7·72	18·79	27·47	46·02	100
	1870 ...	1	37	65	106	·49	3·80	6·27	9·33	2·46	19·11	31·52	46·91	100
	1865-70...	11	167	369	485	1·05	2·75	4·44	7·80	6·55	17·14	27·68	48·63	100
CAUSES ...	1865 ...	12	168	407	314	8·27	12·33	24·74	38·32	9·89	14·74	29·57	45·80	100
	1866 ...	6	118	285	278	4·80	11·78	18·00	27·31	7·76	19·03	29·08	44·13	100
	1867 ...	30	219	406	426	16·70	26·45	25·84	39·24	15·43	24·44	23·87	36·26	100
	1868 ...	27	133	208	267	16·45	14·72	16·24	26·38	22·29	19·95	22·01	35·75	100
	1869 ...	39	373	421	654	16·73	36·61	35·11	57·15	11·49	25·15	24·11	39·25	100
	1870 ...	18	164	185	352	8·84	16·86	17·83	30·97	11·87	22·63	23·93	41·57	100
	1865-70...	132	1,175	1,912	2,291	12·56	19·30	22·99	36·86	13·70	21·04	25·07	40·19	100
CAUSES, EX- DING CHOLERA	1865 ...	9	141	348	285	6·20	10·35	21·15	34·78	8·56	14·28	29·18	47·98	100
	1866 ...	6	108	263	265	4·80	10·78	16·60	26·03	8·24	18·52	28·52	44·72	100
	1867 ...	7	88	223	285	3·90	10·63	14·19	26·25	7·09	19·34	25·82	47·75	100
	1868 ...	20	122	190	246	12·18	13·51	14·83	24·30	18·79	20·84	22·88	37·49	100
	1869 ..	21	215	246	435	9·01	21·10	20·52	38·01	10·17	23·80	23·15	42·88	100
	1870 ..	17	158	178	345	8·35	16·24	17·16	30·36	11·58	22·52	23·80	42·10	100
	1865-70...	80	832	1,448	1,861	7·61	13·67	17·41	29·94	11·09	19·92	25·37	43·62	100

* The equivalent of a single case.

SECTION

THE PRACTICAL LESSONS TAUGHT BY THE STUDY OF THE STATISTICS CONTAINED
OF REGIMENTS IN THEIR FIRST

The statistics of old and new Regiments cantoned together in the same year shown in contrast.

A study of the two tables which follow will help to impress the truth which I have
between the ratios of sickness and mortality in new and old
cantoned together differ. It is impossible to overestimate the
India must be most tenderly cared for, if we would avoid a
I have not selected these six illustrations; they are the whole
able to bring forward as many more, the truths illustrated would not have been less apparent :—

Acclimatised Regiments contrasted with Regiments in their First Year of Indian Service cantoned in the same Station in the same year.

			Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals and Averages.	
Lucknow, 1864.	New Regiment, H. M.'s 36th.	Strength	864	863	859	851	848	842	839	839	825	809	732	754	827	
		Total admissions ...	124	104	110	147	170	212	181	241	361	151	134	72	2,007	
		Fever admissions ...	1	5	16	44	49	102	82	79	100	45	29	8	560	
		Number daily sick ...	38	52	49	68	78	93	90	84	100	83	54	45	70	
		Deaths—All causes, excluding Cholera ...	...	1	...	1	1	5	3	8	4	5	4	1	33	60
		„ Cholera ...	...	...	...	...	...	...	...	...	26	1	...	...	27	
	Old Regiment, H. M.'s 107th.	Strength	864	872	861*	850	849	850	849	849	837	831	866	862	853	
		Total admissions ...	63	53	132	81	97	66	75	91	107	53	54	52	924	
		Fever admissions ...	11	4	15	9	23	23	24	27	14	5	8	7	170	
		Number daily sick ...	23	28	32	32	30	27	27	18	28	21	26	19	26	
		Deaths—All causes, excluding Cholera ...	1	2	...	...	1	1	...	...	3	3	...	...	11	22
		„ Cholera ...	...	...	...	...	...	...	...	...	11	...	...	...	11	
Lucknow, 1869.	New Regiment, H. M.'s 62nd (arrived in the end of February).	Strength	...	...	845	840	836	830	824	785	778	775	781	815	811	
		Total admissions ...	...	...	103	96	92	133	82	233	136	61	62	57	1,055	
		Fever admissions ...	...	...	15	27	22	54	14	47	30	5	1	1	216	
		Number daily sick ...	...	...	33	54	54	66	53	73	78	66	40	41	56	
		Deaths—All causes, excluding Cholera ...	...	...	...	2	8	7	3	9	6	3	2	4	44	86
		„ Cholera ...	...	...	...	...	...	...	...	42	...	...	...	...	42	
	Old Regiment, H. M.'s 102nd.	Strength	...	...	765	732	730	728	727	711	703	700	510*	514*	682	
		Total admissions ...	...	...	94	61	68	82	60	174	74	59	41	35	748	
		Fever admissions ...	...	...	9	6	11	22	21	23	10	10	5	3	120	
		Number daily sick ...	...	...	49	41	41	34	40	50	45	48	27	20	39	
		Deaths—All causes, excluding Cholera ...	...	...	1	...	...	...	1	3	4	...	3	...	12	23
		„ Cholera ...	...	...	...	...	...	...	1	10	...	...	...	...	11	
Lucknow, 1870.	New Regiment, H. M.'s 117th (arrived in the beginning of March).	Strength	...	...	794	794	785	779	777	775	775	774	775	770	780	
		Total admissions ...	...	...	95	111	163	77	81	115	125	104	64	48	983	
		Fever admissions ...	...	...	6	32	79	25	32	33	46	24	15	17	309	
		Number daily sick ...	...	...	54	65	74	63	51	53	64	65	55	46	59	
		Deaths—All causes, excluding Cholera ...	...	...	...	3	12	2	2	1	...	3	1	4	28	28
		„ Cholera ...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	Old Regiment, (in second year of service) H. M.'s 62nd.	Strength	...	...	850	821	774	773	771	770	746	756	762	765	779	
		Total admissions ...	...	...	75	80	60	41	64	78	57	59	55	28	597	
		Fever admissions ...	...	...	8	10	6	2	11	20	11	13	6	3	90	
		Number daily sick ...	...	...	54	59	47	51	64	57	53	46	29	25	48	
		Deaths—All causes, excluding Cholera ...	...	...	1	3	...	1	...	1	1	1	...	4	12	12
		„ Cholera ...	...	...	...	...	...	...	...	...	...	...	...	...	...	

III.

IN THE PRECEDING SECTIONS AND DEDUCED FROM THE MEDICAL HISTORY YEARS OF INDIAN SERVICE.

inculcated in general terms in the first section, namely, that there is a radical distinction regiments. These tables show how the ratios for new and old regiments which happen to be importance of the lessons which this statement teaches. It tells us plainly, that troops new to very exaggerated mortality and an enormous invaliding rate in the early years of Indian Service. that it was possible to bring together from the history of the past seven years. But had I been

BENARES, 1865.	New Regiment, H. M.'s 58th.	Strength ...	775	565	580	560	571	530	531	540	535	539	768	414†	576	
		Total admissions ...	91	78	104	122	212	349	127	192	132	85	155	53	1,700	
		Fever admissions ...	8	17	28	33	87	249	72	88	44	16	37	11	690	
		Number daily sick ...	38	33	45	43	71	132	105	87	71	49	71	35	65	
		Deaths—All causes, excluding Cholera ...	1	...	2	4	5	5	1	1	4	2	1	...	26	35
		" Cholera ...	3	...	...	6	...	...	...	...	...	...	...	...	9	
	Old Troops, 7th Dragoon Guards and Artillery.	Strength ...	623	500	507	429	428	421	420	420	425	425	407	402	451	
		Total admissions ...	61	46	55	52	62	64	47	72	67	72	42	45	685	
		Fever admissions ...	6	5	4	10	11	31	18	27	23	23	7	3	168	
		Number daily sick ...	28	21	28	25	25	34	28	26	27	26	24	22	26	
		Deaths—All causes, excluding Cholera ...	...	...	1	...	...	2	...	1	...	...	...	...	4	4
		" Cholera ...	...	...	...	...	...	...	...	...	...	...	...	...	...	
MEERUT, 1867.	New Regiment, H. M.'s 1-3rd.	Strength ...	712	710	710	710	710	709	708	705	626	597	597	583	673	
		Total admissions ...	68	34	42	79	60	75	76	90	246	151	73	65	1,059	
		Fever admissions ...	9	2	4	10	15	18	23	17	38	85	32	23	276	
		Number daily sick ...	35	26	25	38	32	35	35	38	61	63	45	36	39	
		Deaths—All causes, excluding Cholera ...	...	...	...	...	2	...	1	1	9	7	2	3	25	130
		" Cholera ...	...	...	...	...	...	...	...	13	91	1	...	...	105	
	Old Troops, 19th Hussars and Artillery.	Strength ...	873	865	971	950	945	950	946	937	931	929	894	674	905	
		Total admissions ...	108	95	124	129	109	85	133	108	118	162	100	56	1,327	
		Fever admissions ...	2	6	14	6	10	12	33	31	25	58	27	9	233	
		Number daily sick ...	58	62	70	66	70	56	62	54	52	62	50	18	57	
		Deaths—All causes, excluding Cholera ...	*1	1	1	...	...	...	...	2	1	3	...	...	9	15
		" Cholera * ...	...	...	...	...	...	...	...	3	3	...	...	...	6	
MEERUT, 1868.	New Regiment, 4th Hussars (arrived in the beginning of March).	Strength ...	...	...	458	452	445	444	443	441	440	438	458	484	450	
		Total admissions ...	...	...	88	98	118	95	75	84	84	56	76	77	851	
		Fever admissions ...	...	...	18	31	54	45	37	41	19	17	20	12	294	
		Number daily sick ...	...	...	36	49	56	51	55	50	50	54	50	39	49	
		Deaths—All causes, excluding Cholera ...	...	...	...	...	1	2	...	2	...	2	1	1	9	9
		" Cholera ...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	Old Troops, Artillery.	Strength ...	...	...	534	533	531	529	529	531	532	525	561	611	542	
		Total admissions ...	...	...	46	37	34	46	41	48	74	50	43	29	448	
		Fever admissions ...	...	...	5	7	4	7	13	14	23	13	6	1	93	
		Number daily sick ...	...	...	21	19	19	18	25	32	33	30	28	21	25	
		Deaths*—All causes, excluding Cholera ...	...	...	...	...	1	1	...	...	...	...	1	2	5	5
		" Cholera ...	...	...	...	...	...	...	...	...	...	...	...	...	...	

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* Volunteers to other regiments struck off before the regiment went home.

† Wing marched for Darjeeling.

AGGREGATE OF THE PRECEDING TABLE.

Acclimatised Regiments contrasted with Regiments in their First Year of Indian Service cantoned in the same Station in the same year.

		Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	For the year.
STRENGTHS ...	New Troops ...	2,351	2,138	4,246	4,207	4,195	4,134	4,122	4,085	3,979	3,932	4,111	3,820	3,777
	Old Troops ...	2,360	2,237	4,488	4,315	4,257	4,251	4,242	4,218	4,174	4,166	4,000	3,828	3,878
TOTAL ADMISSIONS	New Troops ...	283	216	542	653	815	941	622	955	1,084	608	564	372	7,655
	Old Troops ...	232	194	526	440	430	384	420	571	497	455	335	245	4,729
FEVER ADMISSIONS	New Troops ...	18	24	87	177	306	493	260	305	277	192	134	72	2,345
	Old Troops ...	19	15	55	48	65	97	120	142	106	122	59	26	874
NUMBER DAILY SICK ...	New Troops ...	111	111	242	317	365	440	389	385	424	380	315	342	318
	Old Troops ...	109	111	254	242	232	220	246	237	238	233	184	125	203
TOTAL DEATHS, EXCLUDING CHOLERA ...	New Troops ...	1	1	2	10	29	21	10	22	23	22	11	13	165
	Old Troops ...	2	3	4	3	2	5	1	7	9	7	4	6	53
CHOLERA DEATHS	New Troops ...	3	...	...	6	...	...	...	55	117	2	...	...	183
	Old Troops ...	...	...	...	...	...	...	1	13	14	...	...	...	28

Ratios of Sickness and Mortality in the New and Old Troops contrasted.

		Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	For the year.
ADMISSION-RATE PER 1,000 ...	New Troops ...	120·4	101·0	127·7	155·2	194·3	227·6	150·9	233·8	272·4	154·6	137·2	97·4	2026·8
	Old Troops ...	98·3	86·7	117·2	102·0	101·0	90·3	99·0	135·4	119·1	109·2	83·7	64·0	1219·4
FEVER-RATE PER 1,000 ...	New Troops ...	7·7	11·2	20·5	42·1	73·0	119·3	63·1	74·7	69·6	48·8	32·6	18·9	620·9
	Old Troops ...	8·1	6·7	12·3	11·1	15·3	22·8	28·3	33·7	25·4	29·3	14·7	6·8	225·4
DAILY SICK-RATE PER 1,000 ...	New Troops ...	47·2	51·9	57·0	75·4	87·0	106·4	94·4	94·2	106·6	96·6	76·6	89·5	84·2
	Old Troops ...	46·2	49·6	56·6	56·1	54·5	51·8	58·0	56·2	57·0	55·9	46·0	32·7	52·4
DEATH-RATE PER 1,000 FROM ALL CAUSES, EXCLUDING CHOLERA...	New Troops ...	·4	·5	·5	2·4	6·9	5·1	2·4	5·4	5·8	5·6	2·7	3·4	43·7
	Old Troops ...	·8	1·3	·9	·7	·5	1·2	·2	1·7	2·2	1·7	1·0	1·6	13·7
DEATH-RATE PER 1,000 FROM CHOLERA ...	New Troops ...	1·3	...	...	1·4	...	...	...	13·5	29·4	·5	...	...	48·5
	Old Troops ...	...	...	...	...	...	...	·2	3·1	3·4	...	...	...	7·2

The bodies compared are in all cases of nearly equal strength, and the aggregate shown in either case is almost identical. There is but the one difference—the old regiments are composed of acclimatised men, while the new are meeting for the first time the influences peculiar to an Indian climate.

And these are the results :—

(PER 1,000 OF STRENGTH).

	Admission-rate.	Fever-rate.	Daily Sick-rate.	Death-rate.	Cholera Death-rate.
New Troops ...	2026·8	620·9	84·2	43·7	48·5
Old Troops ...	1219·4	225·4	52·4	13·7	7·2

The cholera death-rates contrasted in the cases selected.

It may be thought that there is something special in the conditions under which the cholera death-rate is so immensely exaggerated in the case of the new troops. The illustration is undoubtedly very striking; but I regard it as showing only in a clearer light the truth, that the unacclimatised, when debilitated towards the close of their first hot season, succumb as a body when the universal epidemic influence declares its presence.

Four of these illustrations teach the same thing, and the case of the Buffs suggests how great is the risk when the year of arrival in India proves to be a year in which an epidemic is in progress :—

Cholera Deaths of Old and New Regiments cantoned together.

	Lucknow, 1864.	Lucknow, 1869.	Benares, 1865.	Meerut, 1869.
New Troops ...	27	42	9	105
Old Troops ...	11	11	None.	6

The death-rate for all diseases, excluding cholera, is, among the old troops, 13·7 per 1,000, and among the new, 43·7, or 30 per 1,000 in excess in the case of the new. The diseases of the hot months tell excessively against the new soldier. In May and June, among the new troops, 12 per 1,000 are shown as having died, against 1·7 among the old. The diseases of the monsoon season from August to October, are equally in excess in the body of recently arrived men; they give a ratio of 16·8 in the new, in contradistinction to a ratio of 5·6 in the old.

I have remarked before, that malaria plays no important part in the statistics of troops in their first year, which are arranged in this series of tables. The fever-rate shown in the table now under consideration rapidly and steadily diminishes through the malarious season, that is, from August to the end of the year. Bowel complaints and visceral congestions take the place of the fevers of the hot months under the altered meteorology; and while men die from dysentery, as well as from heat fevers and heat apoplexy, before the rains set in, dysentery and hepatitis culminate naturally under the meteorology of the monsoon season. The fevers of the unacclimatised here shown are pure heat fevers. The admission-rate for fever in June is 119 per 1,000 in the new regiments, and 23 in the old; in May it is 73 against 15, and in April 42 against 11. The daily sick-rate and the general admission-rate show the same exaggerations in relation to season.

Ratios of Sickness, Mortality, and Invaliding in the First and Second Years of Indian Service contrasted in the same Regiments.

REGIMENTS.	ADMISSION-RATE PER 1,000.		DEATH-RATE PER 1,000.		DEATH-RATE, EXCLUDING CHOLERA.		INVALIDING-RATE PER 1,000.	
	First Year.	Second Year.	First Year.	Second Year.	First Year.	Second Year.	First Year.	Second Year.
36th Regiment	2,427	1,840 800	79·81	9·90 4·02	44·74	9·90 4·02	67·71	38·46
55th Regiment	994	1,940	30·55	58·70*	17·31*a*	40·49*	8·15	47·57*
5th Lancers	1,479	1,140	43·93	39·34	41·84	33·13	10·46	26·92
1–11th Regiment	1,510	1,120	64·44	23·75	51·31	23·75	39·38	34·44
2–12th Regiment, Wing ...	1,100	970	20·73	12·17	20·73*b*	12·17	45·35	65·70
„ „ Wing ...	1,610	1,090	24·34	8·73	24·34*c*	8·73		48·03
58th Regiment	2,520	1,780 1,170	55·63	38·24 4·55	43·99	26·47 4·55	42·69	50·00 54·54
A. Brigade, D. Battery, R. H. Art.	2,273	1,150	83·33	15·15	83·33	15·15	30·30	53·03
„ E. „ „ ...	1,430	900	7·41	No deaths.	7·41	...	74·07	51·85
„ A. „ „ ...	1,880	1,550	13·70	54·52	13·70	34·01	75·34	61·22
„ B. „ „ ...	2,050	1,740	55·94	30·08	55·94	15·04	76·92	67·67
„ C. „ „ ...	1,620	1,500	49·30	14·49	49·30	7·25	28·17	86·96
41st Regiment	1,600	1,340	28·68	14·09	26·18	14·09	31·17	44·60
8th Brigade, B. Battery, R. Art. ...	1,850	1,790	41·96	28·37	41·96	21·28	48·95	106·38
„ C. „ „ ...	1,280	1,690	27·59	13·61	27·59	13·61	27·59	54·42
„ D. „ „ ...	1,370	1,140	34·25	34·25	13·70	34·25	54·80	54·80
1-3rd Regiment	1,560	950	195·87	18·37	41·24	18·37	20·62	27·55
1-5th „	1,400	1,140	25·57	12·23	17·05*d*	12·23	15·62	23·23
37th „	1,000	720	13·18	11·15	10·25*e*	11·15	29·28	22·30
8th Brigade, E. Battery, R. Art. ...	1,367	1,420	50·36	29·63	50·36	14·82	21·58	59·26
„ F. „ „ ...	1,298	1,280	49·65	74·07	49·65	74·07	35·46	88·89
„ G. „ „ ...	1,134	1,510	70·92	27·59	70·92	6·90	14·18	48·28
„ H. „ „ ...	1,538	1,510	27·58	21·28	20·68	21·28	34·48	56·74
4th Hussars	1,961	1,500	23·66	24·07	23·66*f*	21·88	45·16	83·15
1-6th Regiment	1,501	1,970†	24·30	21·66	24·30*g*	21·66	7·67	32·49
2-60th „	1,313	1,390 2,080	26·55	24·63 31·41	21·49*h*	12·32 28·80	21·49	51·72 52·36
85th Regiment	1,931	3,590†	28·13	17·22	28·13	17·22	15·35	59·04
92nd „	1,871	2,530†	39·59	46·05	39·59	41·32	16·60	62·57
62nd „	1,241	950	105·52	23·17	53·96	23·17	34·77	26·83
1-14th „	1,260	1,780‡	31·58	15·66	18·42*i*	15·66	11·84	90·36

(*a*) Hazareebaugh. (*b*) Rae Bareilly. (*c*) Seetapore. (*d*) Ferozepore. (*e*) Bareilly. (*f*) Meerut. (*g*) Rawulpindee. (*h*) Fort William. (*i*) Cawnpore.

* Exposed in Bhootan in the beginning of the second year, and afterwards stationed at Dum-Dum.

† Epidemic malaria of 1869.

‡ This regiment had 358 admissions from venereal affections.

The ratios for Regiments and Batteries which have arrived in India between 1864 and 1869 shown in detail, and contrasted in the first and second years of Indian Service.

I have placed here the table which precedes, to show in detail, regiment by regiment, what I have already exhibited in the aggregate in the first section of this paper. The annual admission-rates, death-rates, and invaliding-rates of the second year for each regiment and battery, are shown in contrast with the rates of the first year. The general facts hold—that by the diminution of the liability to succumb to heat influence, the admission-rate is considerably less in the second year; that the death-rate is remarkably and consistently low in the second year; and that the invaliding-rate of the second year is normally nearly doubled, as contrasted with the rate in the first year of residence.

Many disturbing elements enter into the composition of the admission-rate, and some of these I have noted at the foot of the table. It is very important to know how new troops have been affected by residence in special localities, and for future reference I have indicated the stations in which the death-rate of regiments in the first year did not exceed 25 in the thousand.

The general laws which determine the aggregate ratios I have sketched in the first section. These I shall illustrate more in detail from the history of the old army in years subsequent to 1858.

The diseases of the unacclimatised diminish year by year as the adaptation to heat influence is perfected.

Sir Ranald Martin has very well stated the truth, that while the tendency of the British soldier in India is to deterioration and decay, there is acclimatisation to heat, where the constitution is capable of adaptation. The constitution of the young is capable of adaptation. The old soldier landed in India dies or is invalided; and the old soldiers are the men above thirty.

The table annexed illustrates very beautifully the adaptation of the army of 1858 to heat influence. The diseases developed under heat influence in the newly-arrived, I have shown to be heat fevers, heat apoplexy, and dysentery. We follow the ratios of the army of 1858 onwards to 1863, up to which time no new regiment had been added, and the progressive diminution of the ratios for the diseases of the unacclimatised is more than remarkable :—

Table showing the gradual diminution of the ratios for Heat Fevers, Heat Apoplexy, and Dysentery in the new Army between 1858 *and* 1863.

(PER 1,000 OF STRENGTH).

	HEAT FEVERS.		HEAT APOPLEXY.		DYSENTERY.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
1858	772·9	16·72	42·9	17·77	202·6	27·14
1859	459·4	5·66	8·7	4·10	118·7	10·20
1860	350·5	4·26	6·2	2·56	75·2	4·68
1861	274·8	3·21	2·2	1·34	65·5	3·67
1862	217·3	2·76	1·8	1·19	48·8	2·66
1863	143·6	2·10	2·3	1·09	47·0	2·48

The significance of the above table seems to be this—that every individual landing in India is obliged to pass through a process of adaptation to heat, and that when this is completed he is left in a position better calculated to withstand the influences of the hot season. This acclimatising process need not result in disease. In the young man's constitution the balance between the normal relations of the vascular system and the controlling nervous influence, may never be disturbed or destroyed; but the tendency to end in disease is strong, and any attempt to force the process must terminate in disaster. This is the meaning of the excessive admission-rates and death-rates in the young regiments.

The constitution of the old soldier is incapable of undergoing the process of adaptation, or possesses the capability in a much less degree than that of the young soldier.

The old man's constitution is little capable of adaptation, and under exposure he dies. The loss of old men in recently-arrived regiments in 1858 was so great as to attract special notice.

The old men of the 6th and 73rd Regiments in particular suffered; indeed, so rapidly did they die off in the case of the 6th, that the regiment was ordered into cantonments at once, and the Commander-in-Chief expressed his fears that under longer exposure the regiment would be rendered useless for service.

Illustrated from the results in the case of old men under exposure in 1858.

I cannot state assuredly that the numbers given in the Regimental Annual Returns, from which the annexed statements are copied, are absolutely correct, and that the ratios are applicable to the precise numbers opposite to which they are placed; but in any case the figures prove how enormous is the loss among old and unacclimatised men when exposed in India to the contingencies of warfare :—

Loss by Death in H. M.'s 6th and 73rd Regiments in 1858, showing the great liability to death under exposure of men above 30 recently landed in India.

		Under 20.	20 to 24.	25 to 29.	30 to 35.	Above 35.	Unknown.
H. M.'s 6th Regt.	Strength ...	143	326	196	83	23	43
	Deaths ...	4	30	18	38	23	...
	Died per 1,000	28	92	92	458	1,000	...
H. M.'s 73rd Regt.	Strength ...	22	597	86	41	19	...
	Deaths ...	1	36	22	21	17	...
	Died per 1,000	45	60	256	512	895	...

Out of these 210 deaths, 165 were caused by heat fevers, heat apoplexy, and acute dysentery. The 6th, exposed in the Shahabad campaign, lost 51 men by apoplexy, 24 by dysentery, and 23 by fever; in the 73rd, dysentery came to the top with 41 deaths, heat fevers gave 21 deaths, and apoplexy 5 only.

Distributed by months, these 165 deaths fall thus*:—

	May.		July.				ber.	
Heat Fever ..	12					• 1		
Heat Apoplexy	28							
Dysentery ..	10			10	17			
TOTAL ..	50	39		14	23			165

The interval between the two manifestations of dysentery, the hot weather and the monsoon culminations, is perfectly marked; heat apoplexy disappears with the clouding over of the sky in July; and heat fever, holding a middle place in its physiological relations between heat apoplexy and dysentery, commencing with a heavy mortality in May and June, is continued until the setting in of the cold season.

These three causes of death accounted for 82 per cent. of the mortality in the war provinces of 1858. It is interesting to note how their relation to the total mortality changes as the army gets older :—

Died from Heat Fever, Heat Apoplexy, and Dysentery, per cent. of the total deaths from 1858 to 1863.

1858.	1859.	1860.	1861.	1862.	1863.
80·44	66·80	47·77	37·11	35·98	31·52

The exposure of 1858 raised the admission-rate for hepatitis very little above the average.

The Hepatitis of the Army of India is a disease of deterioration, rather than an acute disease developed under exposure.

There is no acclimatisation to hepatitis, and in the years from 1858 to 1863, the admission-rate shows but little variation. Hepatitis is, in short, a disease of deterioration, not of acclimatisation :—

Admission-rate per 1,000 of Strength for Hepatitis.

1858.	1859.	1860.	1861.	1862.	1863.
67·0	67·0	63·7	60·4	62·4	63·7

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* Previous to 1860, the annual returns were prepared for the twelve months from 1st April to 31st March, this table includes the months from April 1858 to March 1859.

The 6th and 73rd Regiments, out of a total mortality of 210, returned 8 deaths only under the head of hepatitis, and the same thing was observed in the case of many other regiments. Taking ten regiments, the phenomenon was shown thus :—

Number of Deaths from Dysentery in the Unacclimatised contrasted with the number of Deaths from Hepatitis.

(MORTALITY OF NEW REGIMENTS IN 1858.)

Regiment.		Deaths from Hepatitis.	Deaths from Dysentery.
Her Majesty's 6th Regiment	...	1	24
" *13th "	...	1	18
" 38th "	..	...	44
" 48th "	...	3	48
" 2—60th "	...	...	18
" 73rd "	...	2	41
" 79th "	...	1	26
" 97th "	...	5	48
Rifle Brigade, 2nd Battalion	...	4	33
" 3rd "	...	1	20
TOTAL	...	18	320

Intemperance in the old soldier almost certainly leads to death under exposure to heat.

Many of the men who died in the 6th and 73rd Regiments were hard drinkers. Nothing is more inimical to the acclimatising process than the habitual use of alcohol. The old man new to India dies from heat apoplexy or delirium tremens, or from both; for heat apoplexy is the usual termination of delirium tremens in the hot season. The Surgeon of the 2nd Dragoon Guards, writing in 1860, makes the following remarks in his Annual Return :—

"There were but 15 men in the regiment above 35 years of age; among these, 8 deaths are recorded for the year. Among the young men under 20, numbering 218, not a single death occurred. In most of the old men, death was probably the result, directly or indirectly, of drink. There have been a great many cases of delirium tremens, and they were chiefly, indeed almost exclusively, confined to the Non-Commissioned Officers."

This quotation affords a text on which I might enlarge to any extent. It is a truth that the old soldier in India does drink, and the steady and well-behaved old soldier is too often no exception to the general rule. In the last seven years, 106 deaths from delirium tremens have been recorded, and of these 20 only have occurred in Privates, Sergeants affording no fewer than 86 deaths out of the total.

The 1-11th Regiment, which arrived in India in the beginning of 1865, suffered heavily in its old men before it had been six months in the country. The strengths on landing are noted as under, and the following were the deaths up to the 30th June :—

		Under 20.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and upwards.
Strength	...	10	563	188	67	12	4
Died	...		1	5	8	3	3

These deaths were all caused by heat fever and heat apoplexy, to which the free use of alcohol predisposed. The Surgeon of the Regiment gives the following explanation —"The larger portion of those seized were of a decided intemperate character, and many of them craving drunkards. The predisposing causes may have been in many intemperance, and the period of life between 30 and 40 years of age." And he adds regarding the only man who died out of 573 below 24 years of age—"The patient looked older, and he had been much exposed to the influence of the sun, and was brought to the hospital drunk."

The lesson taught by this case is, that it is useless to send to India with their regiments men above 30 who are known to be habitual drunkards. All the figures brought together in the second section show, that it is not the man above 30 who is efficient for service in India; and if in addition to his age the old soldier brings with him habits of intemperance, the chances are much in favour of his dying or being invalided before the end of his third year of service. The deterioration of the British soldier is what is to be expected. Our invaliding ratios show that with an army composed of a certain relative number of old and new troops, a standard is reached which may be considered permanent; and our Death Tables tell us, that in all diseases of deterioration, it is the old soldier who goes to the bad, whether by a rapid or a slow process of decay.

A steady process of deterioration goes on during Indian Service, and becomes almost universally manifest in the old men as a class.

Let me place here once more the figures showing the liability of men above 30 to die, as illustrating what is meant in speaking of the deterioration of the British soldier. I shall not as before divide off the boys below 20, but class the men in three groups:—

Ratio of liability to death of young men, men of mature age, and old men contrasted—on the results of the period 1865-70.

	24 and under.	25 to 29.	30 and upwards.	Total.
Heat Apoplexy ...	15·01	29·38	55·61	100
Delirium tremens ...	·00	18·18	81·82	100
Dysentery ...	22·94	32·31	44·75	100
Hepatitis ...	14·93	30·46	54·61	100
Phthisis pulmonalis ...	22·53	31·55	45·92	100
Heart disease ...	4·52	23·12	72·36	100
All other causes ...	16·90	30·14	52·96	100
All causes (excluding Cholera)...	21·24	28·96	49·80	100

The loss per 1,000 of strength from the same causes stands thus:—

	24 and under.	25 to 29.	30 and upwards.
Heat Apoplexy...	1·19	2·33	4·41
Delirium tremens	·00	·24	1·08
Dysentery	1·64	2·31	3·20
Hepatitis	1·49	3·04	5·45
Phthisis pulmonalis	1·05	1·47	2·14
Heart disease	·18	·92	2·88
All other causes	2·49	4·44	7·80
All causes	12·77	17·41	29·94

These statements contain no exaggeration of the truth; and the enormously increased ratio in the case of the old, from diseases of deterioration, means simply, that the British soldier can withstand the effects of climate for a limited period only. The army, viewed as a body, can never be expected to furnish a large proportion of old soldiers, adapted by length of residence, to withstand under exposure the influences to which the young men will succumb.

The invaliding teaches the same thing. In the previous section I have shown that it is the old men as a class who furnish the invalids, and that diseases of deterioration—diseases special to the old—form the chief components of the invaliding-rates. These are the diseases which determine the invaliding standard attained during the past six years—a standard which is consistently maintained:—

Invaliding Ratios of the Bengal Army for the Ten Years, 1861 *to* 1870.

Causes of Invaliding.	Invalided per 1,000 of Strength.									
	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.
Fevers ...	1·96	1·74	2·01	1·63	1·58	2·51	3·15	2·69	4·05	4·84
Dysentery and Diarrhœa	2·54	1·46	1·59	1·63	2·91	2·43	2·51	1·72	3·51	2·64
Hepatitis ...	3·81	4·84	5·18	5·05	6·31	7·74	6·24	6·22	7·17	8·06
Phthisis pulmonalis ...	1·56	1·88	2·03	3·32	3·09	3·74	3·09	3·56	4·73	3·72
Heart diseases ...	1·49	1·68	1·67	3·00	3·47	3·29	3·70	3·85	4·65	3·47
Respiratory diseases ...	1·34	·93	1·22	1·19	1·45	1·85	·87	1·49	2·19	1·46
Mental affections ...	·60	·74	·72	·64	1·00	1·05	·49	·90	·96	·56
Epilepsy ...	·45	·54	·74	·77	·67	1·23	·72	·45	·87	·78
Rheumatism ...	3·81	5·45	5·47	3·81	5·35	4·11	3·64	3·17	3·48	3·56
Syphilis ...	·98	2·28	2·42	2·38	3·20	3·66	2·89	2·98	3·36	3·04
Anæmia and Debility ...	2·65	4·00	3·72	5·20	8·89	9·03	11·68	10·13	10·40	11·04
All other causes ...	6·90	5·96	8·20	8·13	8·95	8·40	8·30	8·33	8·61	9·33
All Causes ...	28·09	31·50	34·97	36·75	46·87	49·04	47·28	45·49	53·98	52·50

Estimate of annual loss by death and invaliding.

That we shall by any means adequately counterbalance the effects of the climate of India is not to be expected. The problem is, how far below 7 per cent., which, at a low estimate, is the present loss, we can reduce the annual loss by death and invaliding, which is to be made good by recruiting in England:—

Aggregate Loss per 1,000 *by Death and Invaliding in each year from* 1860 *to* 1870.

1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.
80·88	74·02	59·61	60·05	57·85	71·11	69·15	78·23	66·38	96·87	74·40

How soon the climate begins to tell on the constitution of the newly-arrived, is proved by

Details of Invaliding in the early years nearly the same in all regiments.

same in all, and how the diseases

Invaliding of the Regiments and Batteries which landed from England between 1864 and 1869.

Invaliding of First Year.

CAUSES OF INVALIDING.	Total In-valided.	1864.			1865.					1866.				1867.						1868.									1869.	
		5th Lancers.	36th Regiment.	55th Regiment.	1-11th Regiment.	2-18th Regiment.	88th Regiment.	A. D., Royal Horse Artillery.	A. E., Royal Horse Artillery.	A. A., Royal Horse Artillery.	A. B., Royal Horse Artillery.	A. C., Royal Horse Artillery.	41st Regiment.	8—B., Royal Artillery.	8—C., Royal Artillery.	8—D., Royal Artillery.	1-3rd Regiment.	1-5th Regiment.	37th Regiment.	8—E., Royal Artillery.	8—F., Royal Artillery.	8—G., Royal Artillery.	8—H., Royal Artillery.	4th Hussars.	1-6th Regiment.	2-60th Regiment.	88th Regiment.	92nd Regiment.	62nd Regiment.	1-14th Regiment.
Fever and Insolation ...	36	1	11	...	...	2	1	1	2	1	5	1	1	...	...	1	2	...	...	...	1	...	1	1	...	2	1	1	...	...
Dysentery	48	1	...	3	2	3	8	1	2	1	...	...	2	...	...	...	4	1	5	...	...	1	...	1	...	3	...	2	8	...
Hepatitis	49	...	1	...	6	10	4	1	2	2	1	...	2	...	...	3	2	...	5	1	...	...	...	1	...	4	1	1	2	...
Spleen disease	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Phthisis pulmonalis ...	95	...	39	4	2	4	1	...	...	2	2	1	7	...	1	...	2	...	3	...	...	...	...	10	...	4	2	3	5	3
Rheumatism	25	...	...	...	4	4	4	...	...	...	...	...	1	...	...	1	1	...	2	...	...	...	1	1	...	1	1	1	2	1
Syphilis	25	1	...	...	...	1	1	...	1	...	...	1	3	1	...	...	1	3	1	1	1	1	2	1	...	2	1	...	2	...
Heart disease	33	...	...	1	11	1	3	...	1	3	1	1	...	2	...	1	...	2	1	...	...	...	1	2	...	...	...	1	...	1
Bronchitis	11	...	2	...	...	3	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	2	...	...	...	...	2
Ophthalmia	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...
Otitis and Deafness ...	3	...	...	...	...	...	1	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mental affections	16	...	...	...	5	...	1	...	...	...	...	...	2	...	...	1	...	...	2	...	1	...	...	2	2	...	...	...	...	...
Cephalæa	6	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	1	2	...	...	...	...	...	...	...	...	1	...	...	...
Epilepsy	10	...	...	...	...	1	1	...	...	...	1	...	3	...	2	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...
Injuries	10	...	2	...	...	...	...	...	1	1	...	...	1	...	...	1	...	...	...	...	...	...	...	1	...	...	1	...	2	...
Debility from climate ...	16	2	...	...	...	3	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2	6	...
All other causes	33	...	1	...	1	4	7	1	1	...	1	...	...	3	1	...	1	...	1	1	...	...	...	1	2	...	4	...	1	2
ALL CAUSES ...	418	5	56	8	31	38	33	4	10	11	11	4	25	6	4	8	14	8	20	3	5	2	5	21	6	17	12	13	29	9

Invaliding of Second Year.

		1865.			1866.					1867.				1868.						1869.									1870.	
Fever and Insolation ...	40	...	1	...	1	...	1	...	2	...	...	...	3	2	...	1	3	1	...	1	...	...	1	8	...	3	7	4	...	1
Dysentery	53	1	4	14	...	1	5	...	...	...	...	3	...	2	...	...	...	1	...	1	...	...	...	...	...	5	9	1	1	5
Hepatitis	122	2	4	4	5	13	10	3	2	1	2	1	2	4	1	1	1	1	4	...	1	2	1	3	3	9	6	5	5	26
Spleen disease	3	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...
Phthisis pulmonalis ...	82	...	9	5	7	6	5	...	...	1	1	...	4	...	1	...	1	...	1	...	...	1	1	15	4	1	...	7	3	9
Rheumatism	38	2	1	2	5	3	1	1	...	1	1	...	4	...	...	...	2	1	2	...	1	1	...	2	1	...	2	4	...	1

this table, which shows how, taking regiment by regiment, the causes of invaliding are the of deterioration are general even in the second and third years of Indian Service :—

Syphilis ...	35	2	...	1	2	5	2	1	...	...	...	3	3	...	...	...	...	...	4	1	...	...	1	1	1	2	1	2	...	3
Heart disease ...	89	...	5	5	2	8	1	...	...	3	3	2	8	1	1	1	...	6	5	1	3	1	...	1	8	4	5	2	2	11
Bronchitis ...	32	...	1	1	1	3	1	...	...	1	...	...	...	...	...	...	3	...	...	...	...	2	...	2	1	4	5	5	1	1
Ophthalmia ...	10	...	1	...	...	...	2	...	...	1	...	...	...	...	...	...	2	...	...	...	...	...	...	...	1	1	...	...	2	...
Otitis and Deafness	10	...	...	1	1		2	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	1	...	2
Mental affections ...	12	...	...	2	1	2	...	...	...	...	...	...	1	...	1	2	1	1	...	...	...	...	1	...	...	...	...	...	...	...
Cephalæa ...	5	...	...	1	...	...	...	2	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...
Epilepsy ...	7	...	...	...	...	2	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	1	...	...	2	...	...
Injuries ...	23	...	...	3	...	...	1	...	1	...	...	...	2	...	...	2	...	...	...	...	...	...	2	2	...	1	6	...	...	3
Debility from climate	101	5	2	5	1	3	5	...	2	...	2	2	6	5	...	...	5	1	...	2	5	...	1	2	3	7	1	18	7	11
All other causes ...	55	1	1	2	3	3	5	.	...	...	...	...	4	1	3	1	3	5	2	1	1	...	...	2	4	3	5	2	1	2
ALL CAUSES ...	717	13	29	47	29	49	41	7	7	9	9	12	37	15	8	8	21	19	18	8	12	7	8	38	27	41	48	53	22	75

• Invaliding of Third Year.

		1866.			1867.					1868.				1869.						1870.									1871. •	
Fever and Insolation ...	51	3	2	2	3	2	2	...	...	...	...	...	4	...	1	...	1	6	1	1	...	5	2	4	...	6	5	1	...	...
Dysentery ...	26	...	3	8	...	3	...	...	...	...	...	...	.	...	...	...	1	2	...	1	...	...	1	2	2	3	...	...	...	...
Hepatitis ...	93	3	8	1	7	11	1	1	...	...	1	...	8	...	...	...	4	4	10	1	...	5	...	5	7	5	5	6	...	...
Spleen disease ...	4	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	...	...	...
Phthisis pulmonalis ...	46	2	7	4	3	5	2	...	...	2	...	1	3	...	1	...	...	...	3	...	...	...	1	4	1	...	3	4	...	...
Rheumatism ...	56	...	5	1	2	6	1	1	...	1	...	1	8	2	...	...	8	1	2	1	2	...	1	3	...	4	1	5	...	...
Syphilis ...	40	...	2	2	2	4	2	1	...	1	...	...	3	...	...	...	2	...	7	5	...	1	...	4	...	2	1	1	...	...
Heart disease ...	43	1	3	1	3	7	1	...	2	1	1	1	5	...	...	1		6	4	...	...	...	...	1	...	3	2	...	...	...
Bronchitis and Pleurisy	28	...	2	...	...	2	...	1	...	...	...	...	3	...	1	1	7	...	...	...	1	1	...	...	2	4	3	...	...	...
Ophthalmia ...	9	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	4	...	...	...	...	...
General debility ...	108	4	5	3	4	3	4	1	2	1	3	1	7	3	2	...	4	...	10	...	2	1	4	3	6	6	2	27	...	...
Injuries ...	10	...	...	...	...	...	1	...	...	1	1	2	1	1	...	...	...	2	...	1	...	...	...	...	...	...	...	...	...	...
All other causes ...	113	3	2	8	5	3	5	...	2	3	2	1	5	1	2	4	5	12	15	1	2	1	...	4	6	8	11	2	...	...
ALL CAUSES ...	627	16	43	30	29	47	19	5	6	10	8	7	47	7	7	6	33	33	52	11	7	14	10	30	29	41	34	46	...	...

The special diseases to which young lads are liable in commencing Indian Service.

We may accept as true the general opinion prevalent of late years, that young lads below 20 are very apt to suffer severely from sickness in the first year; and it is certain, that the ratios both of death and invaliding have been much higher among newly-arrived soldiers below 24 than in theory they should be. We may, therefore, with advantage seek to ascertain what are the diseases to which the young lads are chiefly liable, and how the effects of the agencies causing these diseases may best be mitigated:—

Deaths of boys of 20 *and below* 20—1865-70.

	Below 20.	20 years of age.	TOTAL.
Cholera ...	52	51	103
Continued Fever ...	47	66	113
Heat Apoplexy ...	10	19	29
Dysentery ...	6	10	16
Phthisis pulmonalis ...	3	10	13
Hepatitis ...	1	4	5
Heart disease ...	2	2	4
All other causes ...	11	16	27
All causes ...	132	178	310
Excluding cholera ...	80	127	207

Cholera accounts for one-third of the mortality of the boys shown in this table. It is obvious, therefore, that young lads should not, if it can be avoided, be placed in a position where they are likely to meet cholera in epidemic strength. Youth does not save the boys, and their want of acclimatisation tells against them in the encounter with cholera.

In the routine of cantonment life, the death-rate for dysentery is not exaggerated in the young, and among them the hepatitis of deterioration has scarcely been developed; those two causes give but 21 deaths out of the total. Phthisis, which, as we shall see, is very apt to be developed during the acclimatising process, comes next, with 13 deaths. Heart disease shows 4 deaths only, and this number has perhaps been increased by error in diagnosis. Of the total of 27 deaths under the head "All other causes," accidental deaths account for more than half, and the other items are insignificant.

Of the total of 207 deaths, excluding cholera deaths, 142 were caused by continued fevers and heat apoplexy—113 by fever, and 29 by apoplexy. Heat apoplexy is, as a rule, but another stage of heat fever; and virtually, the same influence determines both of these manifestations of disease.

The typhoid of the unacclimatised.

The continued fever from which boys die, is, in almost every instance, true typhoid fever. Although it occurs in every month, it is in the hot months that three-fourths of the deaths from typhoid occur. The typhoid lesion is the characteristic of the fatal fever of the unacclimatised, and the phenomena of the fever are those of true enteric fever. It is not only among the boys that this fever becomes developed; young men up to 24 are equally liable to suffer, and cases will be found pretty numerous among men of the third group, and, occasionally, the fever is seen even in men above 30.

Specially the disease of the young, and of young men in the first year of service.

In his report for 1868, the Sanitary Commissioner has given the details for 35 deaths from typhoid which occurred in this Presidency, and of 9 of men belonging to Bengal regiments, who died in the Kurrachee Depôt. Out of the total of 44, all but 7 occurred in men below 25. Out of 27 deaths in 1869, 7 men were above 25, and 20 below this age; and out of 62 deaths in 1870, 50 were below 25, 9 between 26 and 28, and 3 above 30.

All of the deaths of 1868 occurred among regiments in the first year of service, or among recruits; and the fact I have found to be almost universally true, that it is young men in their first year of service who succumb to typhoid:—

Deaths from Typhoid Fever in 1868, 1869, *and* 1870, *shown in relation to the season of their occurrence.*

	1868.	1869.	1870.	TOTAL.
January ...	1	1	...	2
February ...	1	3	4	8
March ...	...	...	6	6
April ...	1	2	6	9
May ...	4	5	18	27
June ...	14	4	4	22
July ...	2	3	5	10
August ...	6	3	5	14
September ...	4	3	5	12
October ...	1	2	4	7
November ...	...	1	...	1
December ...	1	...	5	6
	35	27	62	124

Peculiarly a fever of the hot season, although it may occur in any month from exposure.

These figures show very clearly, that the fever from which the young men die is a fever of the hot season. The totals above given, convey, however, a very inadequate idea of the part which typhoid plays among the newly-arrived young men. My experience of the statistics of new troops leads me to draw the inference, that the typhoid lesion is in almost every case present when the continued fever of the hot season proves fatal in the young.

Typhoid of the young soldier, January to July 1871.

In the current year, up to July, 71 deaths from fevers have been recorded; of these, 35 have been acknowledged to be true typhoids, and 36 are returned as remittent and continued fevers. We know, however, that very many of the deaths of boys and young men were in reality caused by typhoid, although the disease was returned under the different designation; and probably three-fourths of all these fever deaths were due to true enteric fever.

Nearly all of the deaths from enteric fever were in boys and men in their first year; they were distributed over 18 stations, and 23 different corps.

The ages are shown in the Statement annexed:—

Deaths of the European Army from Fevers, January to July 1871.

FEVERS RETURNED AS ENTERIC FEVERS.		FEVERS RETURNED AS REMITTENT AND CONTINUED FEVERS.	
Age.	Deaths.	Age.	Deaths.
18	5	16	1
19	7	18	1
20	7	19	3
21	4	20	5
22	1	21	1
23	2	22	2
24	2	23	1
25	2	24	4
26	2	25	3
27	2	26	3
30	1	27	1
		28	1
		29	3
		30	2
		31	1
		32	1
		34	2
		40	1
	35		36

The disease is true typhoid. Being a fever of the hot months, the nervous symptoms are usually very severe, so that the disease is at first apt to be mistaken even for typhus by the inexperienced. But to the careful observer the disease soon declares itself, and every symptom shows, that it is the true enteric fever of Europe which is developed in the young and unacclimatised.

The course which such a fever is apt to follow, illustrated.

A single illustration will suffice to indicate the nature of the disease. I select a case recorded by Dr. Becher in the weekly returns of the detachment of the 104th, stationed in Gwalior Fortress, in the hot season of 1865. It will be seen that the gravity of the nervous symptoms led him at first to suspect the case to be one of typhus. Dr. Becher's notes are as follows:—

Fortress Gwalior, week ending 28th April 1865.—"The case returned under febris continua" is that of a young recruit who arrived from England last autumn. He was admitted on the 23rd with very intense fever, great prostration, and head symptoms. No remission of fever has taken place, and he passed the whole week in a state of more or less stupor, with muttering, low delirium. The general symptoms are those of typhus, but as the pathognomonic symptoms of that disease have not yet appeared, the case is returned under febris continua.

5th May.—"The case of febris continua, remarked upon last week, proved to be one of typhus fever. On the 30th (7th day of the disease), the characteristic macular exantheme appeared on abdomen and chest, and the same night profuse epistaxis took place. He continued during the week in more or less profound stupor. There is no remission of the fever; prostration of strength has increased, but nervous excitement and muscular agitation are less. Within the last days symptoms of bronchitis became developed, and complete deafness appears to have set in—all symptoms eminently characteristic of the disease."

12th May.—"The case of typhoid fever progressing favorably during the past week, the 3rd of the disease; the bronchial affection has continued in a mild degree. Unmistakeable signs of typhoid affection of the ileum (diarrhœa with characteristic evacuations, tympanites and regurgitation in the ileo-cœcal region) set in, and still continue in a moderate degree.

The nervous and cerebral symptoms are much improved, though deafness continues absolute; the febrile symptoms are gradually decreasing, and the case promises now (22nd day) to enter the stage of convalescence.

19th May.—"The signs of typhoid affection of ileum were noticed during the 3rd week. During the present (4th) week, the diarrhœa continued more or less; exhaustion of strength and wasting of tissues increased very much, and with it nervous excitement and febrile action. But the last few days have brought great improvement; diarrhœa has almost ceased, frequency of pulse and temperature are falling, and the nervous system is becoming amenable to the influence of sedatives.

26th May.—"The case of typhoid fever has fairly entered the stage of convalescence during the past week. The affection of the ears still continues; the muscular strength is reduced to the lowest possible degree; but the mental powers are gradually returning.

2nd June.—"Convalescence in the case of typhoid fever is progressing favorably."

Some have supposed that the typhoid so prevalent of late years, is a disease new to India. This is not the case. I find a most perfect description of typhoid given by Dr. Stewart in his report for the 9th Lancers as far back as 1844.

Typhoid is not a disease new to India. Want of careful observation has caused its existence to be overlooked. Typhoid between 1844 and 1856.

Going back to the decade preceding that under consideration, the following, which I have selected from the annual report of Her Majesty's 96th Regiment, then in its first year, for 1851-52, links on the history of the past with that of recent times. It is interesting, as showing that twenty years ago young and weakly lads were as liable to succumb to typhoid as at present. The Surgeon writes: "The regiment marched from Cawnpore and was in excellent health on arrival at Lahore. Until 1st April, the men were compelled to occupy their tents, which were under no shade, and the thermometer inside was as high as 104°. The chief feature of the continued fever was pain in the forehead, excessive heat of skin, white tongue, and prostration. In from three to four days the symptoms would subside and the patients recovered. But in weakly, debilitated lads chiefly, the skin would continue hot, the tongue became dry and brown, there was great prostration, and a small quick, hurried pulse. Much care was necessary to guide the patient to convalescence; for diarrhœa in some instances set in,* and death was the result. Some such cases occurred in recruits who joined the regiment soon after its arrival at this station, and some were even brought in in this state. Thus the months April, May, and June passed."

It is very curious to find recent history repeating the fact noticed in the last sentence. Many recruits have died in the Punjab of late years while marching to join their regiments. These young men expose themselves to the sun on the march, and fall into typhoid and die. Nearly all the deaths recorded between December and April are those of boys on the march.

I shall add one illustration more from the history of these ten years. It is taken from the report of Her Majesty's 27th, also in its first year of Indian Service:—

"Many of the cases treated were very tedious in their progress. In the fatal cases almost all assumed the remittent or typhoid type, and on *post mortem* examination the small intestines presented that form of glandular ulceration so usual in the typhoid fever of temperate climates. In one case in particular, the immediate cause of death was profuse and sudden intestinal hæmorrhage, proceeding from the ulcerated surface of the ileum."

Sealkote, 1855-56, Her Majesty's 27th Regiment.

The frequent occurrence of typhoid in the new army of 1858, and in the new regiments raised for service in India subsequent to the mutiny, was remarked on by many medical officers; and throughout the reports for the years from 1858 to 1863, the occurrence of true typhoid in the young soldier has been constantly incidentally noticed.

Typhoid between 1858 and 1863.

A few illustrations taken from my notes, will serve to introduce the subject of the nature of the typhoid of the newly-arrived regiments, and to show the character of the disease. They are selected to prove the universal distribution of the disease, and as demonstrating the presence of typhoid in nearly every cantonment throughout the Presidency, from Peshawur to Lower Bengal.

The cases are isolated. We do not find many cases classed together, constituting an outbreak of typhoid. Such a thing as an outbreak of typhoid was not, as far as I know, recorded in all these years. The indefinite manner in which mention is made of the phenomena in the cases which follow, shows, that the occurrence was regarded by the medical officer as a mere contingency, and not a thing to be looked forward to in the young and unacclimatised, and to be guarded against and treated on the principles on which typhoid ought to be treated when it does occur:—

These illustrations show typhoid not in outbreaks, but in individual cases, in nearly every cantonment of the presidency.

"The cases which occurred at Peshawur were pure typhoid fever, with rose-colored spots, and were complicated with abdominal irritation, bronchitis, or pneumonia."

Peshawur, 1858. Forshall, R. A.

The diarrhœa of typhoid.

Peshawur, 1859. Stewart, Her Majesty's 70th Regiment.

"The most intractable cases were those which at an early stage exhibited a low typhoid character; small, quick pulse; dry and black tongue; great wakefulness; and the tendency to diarrhœa. In two of the three fatal cases, the lower end of the small intestines was found extensively ulcerated."

Peshawur, 1860, 7th Fusiliers.

"This man died after 17 days' illness. The characteristics of the fever were a relaxed state of the bowels and marked febrile symptoms. The *post mortem* examination showed ulcerated patches of the mucous membrane of the ileum."

Peshawur, 1860, Her Majesty's 98th.

"In the one fatal case, Peyer's glands were inflamed and ulcerated in several points. In the three cases of typhoid, the symptoms were so well marked on admission as to admit of the disease being at once designated as typhoid fever."

Dera Ismail Khan. Det. 7th Fusiliers, 1859.

"Three fatal cases of continued fever, which occurred in May, August, and September, presented symptoms decidedly typhoid; the *post mortem* examination showed ulceration of the small intestines."

Nowshera, 1863.

"In a death by continued fever, the eruption was well marked; diarrhœa set in, with the usual depression, and on *post mortem* examination ulceration of the ileum and cæcum was found."

Sealkote, 1862. 7th Dragoon Guards.

CASE 1. *Admitted 18th September.*—"Fever was at first distinctly periodic. *Post mortem* examination revealed very extensive disease in the small intestines; the glands of the ileum were found in every stage of ulceration from simple congestion to actual gangrene, and the intestine was on the point of giving way in several places."

CASE 2. *Died 8th day after admission.*—"The fever was apparently slight, but became typhoid; extensive patches of ulceration were found immediately above the ileo-cæcal valve, one ulcer reaching to the peritoneal coat."

Sealkote, June 1864, 93rd Highlanders.

A case is returned as intermittent fever. Death occurred after 38 days' illness from perforation of the ileum through a gangrenous slough.

F Brigade, F. Battery, Royal Artillery, Sealkote, 19th May 1865.

"A man died yesterday from remittent fever. The case is remarkable, for at the *post mortem* examination very severe inflammation of the small intestines was found. During life there were no symptoms of this disease at all. There was slight diarrhœa when he first came into hospital, but this soon subsided. The abdomen was carefully examined daily, but there were no symptoms of inflammation. The man was a recruit and joined the battery this year" (aged 20).

"There is another bad case of remittent fever. The accession of fever is now slight, but he is very debilitated, and very nervous about himself. This man is also a recruit."

The sequel was as follows:—

Sealkote, 26th May.

"The case of fever referred to last week died suddenly on the morning of the 25th. There was no effusion on the brain; the lungs were congested, but everywhere crepitant. The small intestines were healthy except for about two feet above the cæcum; here the internal coat was highly congested, and there were about a dozen circular ulcers scattered over this space, with raised and thickened edges. The glands did not appear to be enlarged. The large intestines were healthy."

Ferozepore, 1861, H. M.'s 79th.

"In a young man of 20, who had not long joined, the symptoms at first were those of ordinary continued fever; but the fever soon took on a typhoid character, with great prostration and considerable cerebral disturbance. An uncontrollable diarrhœa assisted in reducing the patient's strength; pulmonary congestion supervened, and he died on the 22nd day. Small intestines were generally congested and ulcerated, and the glands much enlarged."

Meean Meer, 1859, H. M.'s 79th.

"Two cases of continued fever which proved fatal were of a well-marked typhoid type, accompanied with ochrey evacuations, and occasionally low delirium. At the *post mortem* examination the bowels were found ulcerated."

Jullundur, April 1860, H. M.'s 46th.

"In the only case of remittent fever which occurred, the patient sank on the 18th day. On *post mortem* examination, the small intestines were found ulcerated in many places, and Peyer's patches very prominent."

Jullundur, 1863, H. M.'s 94th.

"Two deaths in August from continued fever. One died in typhoid on the 16th day, and there was found after death extensive ulceration and infiltration of Peyer's glands. There was little diarrhœa during life."

Umballa.

Patient aged 21. "The symptoms of the fever were of an unusually persistent character, which the usual treatment did not check.

"Epigastric pain became distressing, and he was clearly suffering from peritonitis. On *post mortem* examination the ileum was extensively inflamed and the mucous surface abraded, and one small round perforating ulcer about a quarter of an inch in diameter. The mucous membrane of the large intestine was free from ulceration."

Subathoo, 1856, 2nd Fusiliers.

"Remittent fever prevailed in June and July, and frequently ran to a low continued typhoid form. Some of the cases were very intractable and severe, and the head was affected at an early period. Two cases terminated fatally, and in both the characteristic patches of effusion into Peyer's glands were present."

Meerut, 1857, 6th Dragoon Guards.

"The fatal cases of fever were frequently of a low type, affecting the head; in several cases there were found indications of local disease in the small intestines."

Meerut, 1860, Her Majesty's 35th.

Aged 20; admitted August 24th. Symptoms of remittent fever; died on third day after admission. "Morbid appearances were entirely confined to the lower third of the small intestines, the mucous membrane of which was closely studded over with enlarged mucous glands, the size of a hemp seed; there were numerous ulcers also found with fungous surfaces."

Agra, 1862, Her Majesty's 35th.

June.—Continued fever. "The man had been for some days quite recovered, but the fever returned, and he rapidly became exhausted."

"On *post mortem* examination, numerous deep ulcers were found in the small intestine."

Agra, 1863, 23rd Fusiliers.

Two deaths in April from typhoid and continued fever; both attended with intestinal ulceration, diarrhœa, and eruption.

Saugor, 1858.

Aged 20. Fever, with pain in right iliac region; died comatose on 7th day. Congestion of the lower part of the ileum was found, with enlargement of Peyer's glands.

Jubbulpore, 1864, Her Majesty's 91st.

"The case of remittent fever and diarrhœa was attacked with peritonitis three days ago, and proved fatal. Deep ulcers were found in the ileum, but decided perforations could not be detected."

Jubbulpore, 1862, Her Majesty's 97th.

Admitted 10th April, with severe continued fever accompanied with diarrhœa. The diarrhœa subsequently much abated, but he fell into a typhoid state and died on 16th.

"Spleen, three times its natural size; liver, also enlarged; mesenteric glands, infiltrated with tubercle; solitary glands of lower part of ileum, infiltrated, inflamed, and deeply ulcerated with ragged, thickened edges."

Bareilly, 1863.

A death by peritonitis, ulceration and perforation of the ileum in fever; returned as intermittent.

Futtehgurh, 1863.

A case of true typhoid fever, with rose-coloured spots, which ended in recovery, is mentioned.

Allahabad, 1860.

"A recruit, six weeks in India, admitted with slight fever, which soon assumed the remittent form; exacerbations coming on about noon. On the fourth day after admission he became delirious and had melænic purging. Died six days afterwards. Two large patches of ulceration were found near the caput cœcum, in the small intestine."

Allahabad, 1857.

"Lieutenant S. had suffered for some time from low remittent fever. Shortly after his arrival, gentle perspiration broke out, and he became cool. But still he had an evident difficulty in concentrating his thoughts, and a disinclination to reply to questions by other than monosyllables, as if the effort of talking were weakening and painful. Bowels were gently moved three times by a small dose of purgative medicine. He had very slight fever for the three following days, and no purging; the tongue became cleaner, and the inclination for food returned. He was suddenly seized with great pain in the abdomen, more particularly noticed on pressure over the right iliac region. Peritonitis immediately followed and he died. *Post mortem* examination disclosed inflammation of the small intestine, with ulceration of the ileum in two places and escape of its contents."

Lucknow, R. H. A.

"The Hospital Sergeant was under treatment in his quarters for remittent fever and diarrhœa, and had been taking lead and opium and quinine for about 10 days. He became suddenly collapsed, and died with all the usual symptoms of peritonitis in six hours. A small ulcer was found in the ileum, which had opened into the cavity of the peritoneum. A few other circular ulcers were discovered in the lower part of the ileum."

Lucknow, 1859, 23rd Fusiliers.

"Two fatal cases of remittent fever occurred in April. Diarrhœa continued a prominent and troublesome complication throughout. Symptoms of disturbance of the brain manifested themselves about the 5th or 7th day. The tongue became dry and brown, and the teeth covered with sordes; the skin, except when the fever remitted, was hot and dry. In the one case, after death numerous small ulcers were found in the small intestines; in the second case, an ulcer had almost eaten its way through the coats of the bowel."

Fyzabad, H. M.'s 34th.

"A man was admitted with diarrhœa on 1st March. The diarrhœa was cured; but as he remained weak and dyspeptic he was retained in hospital. On 10th April, he was suddenly seized with peritonitis, and died the same night. A single small ulcer of the ileum had opened into the abdominal cavity."

Goruckpore, 1860, H. M.'s 13th Regt.

"Admitted 12th April, with fever preceded by shivering. A month after admission, his appetite began to fail, and he lost flesh rapidly. The abdomen became tender and tympanitic, and an abscess formed in the muscles over Poupart's ligament. He died on 17th May. The viscera were found glued together, with fluid in the abdominal cavity, owing to ulceration of the small intestine, which had perforated the peritoneum."

Hazareebaugh, 1862, H. M.'s 77th.

"In a man who had been admitted with ulcer of the mouth, many ulcerations of the ileum were found after death, the existence of which was not suspected during life."

Raneegunge, 1858, Dr. Bow.

1. "The man was attacked with fever of a low type, accompanied with looseness of the bowels; the symptoms so far resembled dysentery that at one time he was re-admitted under this head; but the *post mortem* examination showed no disease of the colon, but extensive destruction of the glands of the ileum."

2. "A man of the 29th Regiment, was seized with fever at Sherghotty, but was so far recovered as to be considered a convalescent. Shortly before his arrival at Raneegunge, he felt worse; his tongue was found dry, but not coated; no sordes; slight head symptoms; no tenderness on pressure over the abdomen. He took plenty of nourishment, but sunk after three days. The colon was perfectly healthy, but extensive ulceration of the glands of the ileum was found."

Dacca, 1859, Det. H. M.'s 19th Regt.

July 24th.—"The man had felt unwell for 12 hours, since bathing in a tank after dinner. Tongue furred; headache excessive; *28th*, slight delirium; *29th*, very restless, and in the evening profuse diarrhœa; *August 6th*, only partially conscious; *7th*, died."

"Patches of ulceration were found on the mucous membrane of the ileum."

Chinsurah, December, 1864.

Recently, at Chinsurah, a low typhoid form of remittent fever appeared among the troops quartered there. The first case of it was in hospital, when I took over the medical charge of the depôt, and he died three days afterwards. Between the 25th November and 4th December seven cases occurred, of which two proved fatal, including one officer.

The remittent fever assumed a well marked typhoid character such as is seen in England, but which I have never before seen in this country. The cases exhibited rose-coloured spots, they were attended with diarrhœa, and *post mortem* examination showed ulceration of the intestines. Exacerbation generally took place at 3 o'clock in the morning, and at 3 o'clock in the afternoon. Head symptoms set in at a very early stage of the disease; there was deafness, confusion of ideas, and tremor of the extremities ultimately assuming the character of subsultus tendinum, with spasmodic switching about the mouth and eyes, great prostration, and low muttering delirium. In this state they continued, with occasional attacks of epistaxis during an exacerbation, gradually sinking lower and lower, until they died. At a very early stage of the disease, difficulty in protruding the tongue, accompanied by difficulty in articulation and swallowing, were present; and in those cases that proved fatal, complete paralysis took place several hours before death. When these symptoms began to improve, it was the first sign of convalescence, which was in every case very protracted."

Since the arrival of new Regiments and large bodies of recruits, the subject has assumed an aspect of great importance—Typhoid of H. M.'s 36th.

These cases occurred chiefly in young recruits; but with the arrival of new regiments, in 1864, the study of typhoid assumed a new interest and importance.

The very first regiment that came to India after 1858 was decimated in the first year, and chiefly by typhoid. But even with so grave an experience, Dr. Bell failed to apprehend the great significance of the facts which he was placing on record. The following is the narrative which he gives:—

36th Regiment, Lucknow, 1864.

"The regiment continued in good health until April, when the increasing heat of the weather began to tell upon the young unseasoned soldiers, and fevers became prevalent. They presented no great variety. A few have been returned as common continued; there were only 24 cases of intermittent; the rest were returned as remittent. Of these last, at least ten cases might with equal correctness have been called typhoid; it was difficult to say on admission, and perhaps unimportant, whether they were remittents with a typhoid tendency, or typhoid with a remittent tendency. My own opinion is, that the local complication determined the type; but the result is the same, and one for which I was wholly unprepared from my experience of six years in Madras, namely, that a typhoid fever almost identical with that of Europe, with ulceration of Peyer's glands, prevails in this country, and is as fatal as at home. It seems the same disease in every respect, but that there are no petechiæ,* and that there is a greater tendency to remissions. From the enquiries I have made, I believe it to be a new disease in this country, and it is certainly a very fatal one. I can assign no probable cause for it. It is unnecessary to describe the symptoms: in the treatment, the indications were to abstain from purgatives and all irritating medicines, and to support the patient by beef-tea and wine liberally. The disease prevailed all though the hot season, and proved fatal in 7 cases."

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* This is a mistake; the characteristic eruption is almost invariably present.

The fact is, that the 36th Regiment as a body was saturated with typhoid poison; and that the disease was typhoid is proved by referring to the ages of the men who died, or were invalided for remittent fever and phthisis. There were 130 men above 30 years of age with the regiment when it landed. Of these, not one died from remittent fever or phthisis, and four only were invalided under these heads. Of the younger men, 20 died from remittent fever and phthisis, and 51 were invalided on the same account—a loss of 30 per 1,000 in the older class, and of 108 per 1,000 in the younger. From all causes, this Regiment lost in its first year 68 men under 24, 19 being entered as 20 years old or under.

Filling up of the lungs subsequent to the attack of typhoid—a phenomenon observed in the typhoid of 1851, as well as of 1864.

Dr. Bell goes on to explain, that the phthisis for which 39 young men of the 36th were invalided, was in reality the filling up of the lungs subsequent to the attack of fever; so that it is necessary to place these cases to the account of typhoid. The same phenomenon is noticed in the report from which I have already quoted, the report of the 96th Regiment for 1851-52, in the following terms:—

"In many of the fatal cases tubercular diseases of the lungs was found in a passive state, or in the act of softening; whilst in the same individual there was enlargement of the glands of the mesentery. Phthisis has exceeded the average, and it is thought that this climate is especially adapted to its development. But the prevalence may have been due to excessive debility induced by attacks of fever."

The invaliding rolls of the new regiments show how important a place phthisis holds; and the possibility of the physiological connection of the lung infiltration with that which takes place in Peyer's glands, and in the mesenteric glands, should not be overlooked.

The significance of this typhoid and its physiological course.

I do not propose to discuss the physiological significance of the typhoid of the unacclimatised. I wish to impress the practical truth, that every body of young men which comes to India, may be expected to suffer from typhoid in the first hot season; not because of a special poisoning derived from the locality in which it may be placed, but because in the young, when the influence of heat tells on the nervous system, infiltration of Peyer's glands follows, the characteristic eruption is manifested, and the fever pursues its course and ends in resolution or in death.

From observation, I am inclined to believe that the physiological resolution of a typhoid commences on the fourteenth day. In cases where the onset is sudden and well defined, the nervous symptoms will probably be the prominent feature of the fever during the first week; and when great heat is present, death by heat apoplexy is apt to ensue. About the eighth day, the eruption is likely to be found, if carefully looked for. On the fourteenth day, the sloughs over Peyer's glands will be found to have separated, and may be detected in the stools. The patient may be at the worst at this time, and no improvement either in the appearance or pulse, indicative of a crisis, may occur. But as the commencement of the resolution of a pneumonia dates physiologically from the fourteenth day, the same phenomenon, I am inclined to believe, will be found to hold in the case of the typhoid of India. It is about the twenty-first day, under favourable conditions, that the fever abates, and the pulse sinks below 100, in the natural course of convalescence.

All new Regiments suffer on first coming to India.

The 5th Lancers and the 55th Regiment, which came to India, with the 36th, in 1864, also suffered from typhoid, although not to the same degree. I might follow the history of every regiment and battery which has arrived between 1864 and 1871,* and the truth would hold throughout, that not one of these bodies has escaped typhoid in its first year of residence. I have had repeated opportunities of calling attention to this fact; sometimes even in anticipation of the arrival in India of regiments which have suffered subsequently. Thus, when it was proposed to place the 1-17th Regiment on arrival from England in the spring of 1870, in the new barracks at Allahabad, I considered it a certainty that if cantoned at this station, the typhoid of the young would be developed in intensity, and that the new buildings and the conditions of the locality would be blamed for the excessive loss that would follow. The regiment was eventually sent to Lucknow, and the experience of the 36th was repeated; a history of typhoid runs through the returns of the year, and 16 men died from continued fever, of whom 14 were below 25, and 2 of 27 and 28 years of age.

The existence of typhoid has necessarily attracted notice of late years, and various theories have been framed to account for its development.

Of late, the subject has forced itself upon the attention of regimental and administrative medical officers. So many young men and new regiments have landed in India, and so constant has been the occurrence of typhoid, that the phenomenon could not escape observation. Various theories have been advanced to account for the individual instances of the outbreak of typhoid when it has occurred. Importation and the condition of the water-supply, are urged by various writers as the cause of the manifestations of typhoid. Years ago the same theory of importation was started. Mr. Cornish brought it forward to account for the fact, that at St. Thomas' Mount at Madras, the tendency of many of the fever cases, especially those which occur in recruits or new arrivals, was to assume the typhoid character, suggesting that the germ was imported by the troops which arrived in 1857-58. Dr. Munro thinks it possible that the typhoid fever from which the 92nd suffered so heavily, may have come with them from Ireland. Dr. Skene considers that the bad water-supply of Meean Meer accounts for the typhoid of the 85th; and Dr. Barclay considers that the water-supply of Bangalore is not above suspicion, and may be the cause of the typhoid which attacks the young men. Mr. Hanbury, under whose care the young men of his regiment suffered extremely, at Deesa in Bombay, approached very near what I consider to be the truth, when he observed, that the local causes which he searches for may have been the cause of the typhoid, provided we leave out of sight the possibility of typhoid occurring in the young and unacclimatised without the intervention of such agencies. "It is worthy of particular mention," he adds, "that two-thirds of the total mortality assigned to fever in the regiment, occurred among the young men recently landed, as indicating the impropriety of sending young unformed lads to this country as recruits from England, that the average age of the subjects of these fatal cases was only 20 years and 6 months."*

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* A paper on the typhoid of Her Majesty's 63rd Regiment, which reached Hazareebaugh from England in December 1870, by Assistant Surgeons Hannah and O'Farrell, appears in the *Indian Medical Gazette* for October 1871.

While typhoid is a disease generated in the individual constitution, it is at the same time a truly zymotic disease, and as such liable to spread through a community.

Let me repeat in concluding this most important subject—important alike to the sanitary officer, and to the student of the etiology of typhoid—that I know of no single circumstance that would suggest to me that the type of the fever of which I am speaking is determined by local causes. Typhoid has no geography, and it is of universal occurrence; taking, for example, the deaths recorded in 1869, as they stand in our death-rolls, the 27 deaths are returned from 21 stations.

But in making this broad assertion I would not be misunderstood. That there is a zymotic element developed in every individual case of typhoid I believe to be a fact, and a truth that should be acted on in every case as soon as typhoid makes its appearance in a body of men. I believe that such calamities as those of the 36th, would be much mitigated were the first cases carefully separated; for it is not possible to imagine, that in this case mere community of condition caused nearly one-tenth of the regiment to fall into typhoid. Typhoid should be regarded as contagious in the same degree as erysipelas or the non-specific cachexies of our jails, and sanitary measures should proceed on such an assumption. Such cases as the outbreak at the Bishop's School at Simla in 1866, so well recorded by Dr. Clark,† in which 17 cases occurred among 69 boys and young men, teach, that a zymotic poison does exist to which young men succumb as communities and not as individuals.

It is an extraordinary fact that the records of the Native Army and Jail Population afford no authentic history of typhoid.

A further theory suggests that typhoid may be acquired by contagion from the native population. I know of no single record of the existence of typhoid among the native population. In the records of the Native Army I do not know of a single death attributed to typhoid which is not open to the suspicion that it has been wrongly diagnosed or carelessly returned; and out of 41,246 deaths among the jail population, which I have recorded between 1859 and 1870, I do not know of any death which may have been returned as typhoid, which is not equally liable to the same suspicion. I do not make this broad statement willingly, and I would rather that its accuracy were called in question, and that well-authenticated cases were put on record. If it should be the case that the liability or non-liability to typhoid is a remarkable race distinction, it is important that the point should be established. It has been my wish in recording the deaths of the Native Army and of the Jails, to eliminate deaths from typhoid, with a view to the study of the etiology of the disease as it may exist among the native population; but as yet I have no data to go upon, although my compilations have been made from nominal rolls in which all particulars of interest are supposed to be noted after each death.

CONCLUSION.

In these pages, I have tried to show how the ratios for new and acclimatised troops differ, and how the ratios vary with age among the newly-arrived as contrasted with those of the army generally; and I have endeavoured to impress the chief lessons suggested by the study of these ratios, by contrasting the history of old and new troops, and old and young men, placed in parallel circumstances.

General deduction from the facts recorded.

To sum up. In every aspect in which we have viewed the soldier, the truth has forced itself upon us, that his constitution is prone to decay under the influences to which he is subjected during the period of his service in India; as a young man he succumbs to one class of diseases, as an old soldier to another. The old man is not efficient for a lengthened residence if he comes old to India; and if his constitution is bad, or his habits intemperate, he dies. Young boys, who have to take their chance in common with the men of the regiment, are apt during the process of adaptation to heat to die, or to contract disease which may lead to their being sent back to England as invalids, before they have attained the age at which a man becomes an efficient soldier in India; and a year absolutely healthy for the native, and favourable to the acclimatised European, is that in which the young suffer, as a rule, most severely, since it is generally characterised by a prolongation of the hot season. Regiments coming to India for the first time require to be tenderly cared for, since the exaggeration of climatic agencies, or the presence of epidemic influences, tell upon such bodies far more than on those which have been habituated to cantonment life in India. The soldier at the best is adapted for a limited period only of Indian Service, and he should begin his service young, as soon as his constitution is formed; the age at which the soldier is efficient may be reckoned to terminate soon after 30.

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* Army Blue Book for 1859, p. 119.

† Indian Annals, XXIII, page 145.

The judicious selection of stations for regiments newly-arrived is of great importance.

The selection of stations adapted for regiments at the different periods of their service is in every case, of great importance, and in the case of regiments arriving from England, a judicious selection of a station may tell much for good or evil in the future. Provided the material be good, a hot station is not necessarily an unhealthy one for a new regiment. Agra, Ferozepore, and Cawnpore have not proved unhealthy to the new regiments which have occupied these stations; the fever-rate is necessarily high, but it is no detriment that the young man should pass through a seasoning fever, provided his constitution is left unimpaired. Bareilly has shown itself to be a first class station for a new regiment, and this part of India seems peculiarly adapted for new troops. Stations subject to the minor degree of heat influence, such as Fort William and Hazareebaugh, seem also well suited for newly-arrived regiments.

Stations least subject to epidemic influences should, if possible, be selected.

In every station there is the chance that the new troops may meet the influences of an epidemic year, and they cannot be ensured against such a contingency. Agra, Ferozepore, or Hazareebaugh may show the maximum of health in one year, and in the next, under epidemic influences, the maximum of disease. Judging from past experience, the occupation of stations such as Fort William, Bareilly, or Sealkote would afford a great chance of exemption from epidemic influences.

It is better to avoid sending to the hills a new regiment which has suffered excessively from heat influence in the first year.

It seems a mistake to hurry a regiment to the hills which has suffered heavily in its first year. The 36th Regiment regained its vigour in the second year in Rohilcund, after passing through the extreme of suffering at Lucknow in its first year; and there can, I think, be little doubt, that the wing of the 58th removed from Benares to Darjeeling at the close of its first year, did suffer in comparison with the wing which was not removed, on being brought down to Allahabad and subjected to the influences of an unhealthy year, although on rejoining it was in a state of absolute health and vigour. The fact, that the whole body of a regiment has passed through the hospital with heat fever, should be regarded rather as giving an assurance, that the men will be able to stand the heat of the second year. I speak of heat only, and not of heat in combination with epidemic influences.

Question of sending young men and new regiments to the hills on first arriving in India.

It has been proposed to send young men and young regiments to the hills on first landing in India. The men would certainly retain their vigour, especially if employed actively at a sufficient elevation; and six months of active exercise in the plains up to the commencement of the hot season, would do much towards acclimatising the men to the effects of heat. In theory, a regiment spending the two first years of its service in this manner should be perfectly fit to take its turn in the hottest station without detriment. Such a proposition must, of course, be looked at in connexion with the enormous losses which in recent times regiments newly arriving have sustained within the first three years after coming to India, which are shown at the close of the second Section.

It seems contrary to sound principle that young men coming to India as recruits should at once be sent to join their Regiments, irrespective of the station occupied.

It seems opposed to sound principle that young boys who come out as recruits should be promiscuously scattered over India, in good stations and in bad, as soon as they are landed. In the last six years, 13,000 recruits have been received by the regiments of this Presidency; and if there be a principle on which the young men should be acclimatised, this principle has been set aside in the case of this large body of young and unacclimatised material. There may be objections on military grounds, but I should be inclined to consider, that the lads coming to India as recruits would serve the State better were they acclimatised on principle for the two first years. This simply implies, that they should be kept together as a body at a first-class station, such as Bareilly or Sealkote, and that they should be judiciously exercised, and not forced into disease by being ranked with men who can stand with impunity an amount of exposure under which the young lads must go down. Bareilly and Sealkote are situated beyond the range of the epidemic influences so deadly to the newly-arrived, or, at least, are very rarely reached by such influences. Both are hot stations, and the recruit might take his place in any regiment after having spent two years in such a climate. The recruits even in these healthy localities would suffer both from heat fever and typhoid; but such a consideration would be of secondary importance, provided we could recognise it as a truth, that the young men were being adapted for further service in India on principles substantially sound.

How the constitution of the Army of India changes from year to year.

The table which follows shows the changes which have taken place in the regiments composing the army during the past six years. There have been removed by death 5,546, by invaliding 9,958, by expiry of service 9,425, and by other causes 1,151; and to make up for these losses, 13,252 recruits have been received, regiments leaving India have given back 5,962 men, and of the men invalided to England 858 have returned. The items which balance the account are detailed in the following statement.*

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* The statement is a regimental one, and for regiments present during the year; hence the strength remaining does not correspond with that carried forward to the next year.

Statement showing the Gain and Loss of the Regiments of the Army of Bengal in Strength during six Years, from 1865 to 1870.

		1865.	1866.	1867.	1868.	1869.	1870.	Aggregate of six years.	Proportion of Gain and Loss from different causes in percentages.
Strength at the beginning of the Year.									
At Head Quarters and on Detachment at the beginning of each year ...		37,647	35,595	35,077	31,336	33,847	31,761	205.263	
Recruits from England in India on march to join		896	527	345	258	692	161	2,879	
On Staff employment		192	172	151	130	148	97	890	
In Military and other Prisons		227	210	146	155	213	193	1,144	
Elsewhere, sick in other Hospitals, and men remaining at Convalescent Depôts...		1.343	664	1,133	1,316	845	688	5,989	
TOTAL STRENGTH IN INDIA AT THE BEGINNING OF EACH YEAR ...		40,305	37,168	36,852	33,195	35,745	32.900	216,165	
Additions during the Year.									
Transfers received from other Regiments		361	794	918	826	665	640	4,204	17·26
Transferred from Regiments leaving India by volunteering	From Bengal Presidency ...	916	1,430	554	415	260	536	4.111	23·42
	From other Presidencies ...	340	44	15	375	351	470	1,595	
Recruited in India	New Soldiers	62	84	63	96	7	56	368	1·51
	Time-expired men	162	12	4	12	64	2	256	1·05
Received from England, landed after 1st January	Recruits	1,351	2,071	275	4,018	2,069	3,100	12,884	52·89
	Invalids returned	116	46	20	169	288	219	858	3·52
Deserters rejoined		18	9	10	11	22	15	85	·35
TOTAL ADDITIONS OF THE YEAR ...		3.326	4,490	1,859	5.922	3,726	5,038	24,361	100·00
Loss during the Year.									
Transfers given to other Regiments		954	2,068	2,665	1.021	1,124	1,074	8.906	25·46
Time-expired men, who have left the service		2,287	2,103	1,447	1,375	1,388	825	9.425	26·94
Men who have purchased their discharge		201	129	137	47	46	36	596	1·70
Men discharged otherwise		17	28	13	3	1	8	70	·20
Invalided	For discharge	633	608	546	419	506	270	2,982	28·46
	For change of climate ...	1,076	1,109	1,089	983	1,296	1,423	6,976	
Dismissed by sentence of Court Martial		16	17	15	20	39	70	177	·51
Deserted		31	38	42	47	93	57	308	·88
Died at Head Quarters and on Detachment...		802	591	996	543	1,410	657	4,999	15·85
Died absent from the Regiment ...	At Convalescent Depôts ...	40	54	38	29	37	41	239	
	In other Hospitals ...	76	60	37	60	42	33	308	
TOTAL LOSS OF THE YEAR ...		6,133	6,805	7,025	4,547	5,982	4,494	34,986	100·00
STRENGTH OF THE ARMY AT THE CLOSE OF EACH YEAR ...		37,498	34,853	31,686	34,570	33,489	33,444	205,540	...

Table showing the results of twelve years of Indian Service in a body of men who landed in India with their Regiments in the end of 1857, and embarked for England in 1869 and 1870.

REGIMENT.	Date of arrival in India.	SERVICE IN INDIA.		Date of leaving India.	Strength on arrival in India.	STRENGTH ON ARRIVAL AT DIFFERENT AGES.						Number out of the preceding Strength with Regiment at date of embarkation.	DETAILS OF THE SURVIVORS.							
													Age.				Service in years.			
		Years.	Months.			Under 20 years.	20 to 24.	25 to 29.	30 to 34.	35 to 30.	40 and upwards.		Under 30.	30 to 34.	35 to 39.	40 and upwards	11 to 15.	16 to 20.	20 to 25.	25 and upwards
2nd Dragoon Guards.	27th Nov. 1857	12	1	31st Dec. 1869	582	28	331	175	34	11	3	78	1	48	23	6	63	10	4	1
7th Hussars ...	30th Nov. 1857	12	3	28th Feb. 1870	518	40	297	116	43	22	...	50	1	21	27	1	35	15	...	...
1-7th Regiment ...	24th Nov. 1857	13	0	2nd Dec. 1870	986	349	445	124	49	19	...	74	4	32	28	10	41	26	4	...
77th Regiment ...	15th June 1858	11	10	14th April 1870	510	48	261	150	31	15	5	58	3	39	14	2	42	15	1	...
82nd Regiment ...	12th Oct. 1857	12	3	17th Jan. 1870	892	279	323	139	129	22	...	195	...	112	82	1	†	†	†	...†
88th Regiment ...	2nd Nov. 1857	13	0	17th Nov. 1870	953	99	531	213	89	16	2	82	11	37	32	2	54	28	...	...
95th Regiment ...	26th June 1857	13	3	2nd Oct. 1870	725	156	260	157	79	58	15	57	5	21	20	11	13	43	1	...
Royal Artillery, 14th Brigade* ...	End of 1857 ...	12	0	Nov. 1869 ...	670	44	301	226	81	18	...	82	1	52	23	6	67	10	5	...
					5,836	1,043	2,752	1,300	535	181	25	676	26	362	249	39	...	...	...	...

CAUSES OF LOSS.	LOSS OF THE DIFFERENT REGIMENTS.								LOSS PER 1,000 OF STRENGTH.								Totals for the body.	Totals per 1,000 of Strength.	Loss from the different causes per cent. of the total loss.
	2nd D. Guards	7th Hussars.	1-7th Regt.	77th Regt.	82nd Regt.	88th Regt.	95th Regt.	R. Art., 14th Brigade.	2nd D. Guards.	7th Hussars.	1-7th Regt.	77th Regt.	82nd Regt.	88th Regt.	95th Regt.	R. Art., 14th Brigade.			
Died from disease	154	146	119	186	223	227	103	198	264·6	281·8	120·7	364·7	250·0	238·2	142·1	295·5	1,356	232·4	26·3
Killed or died from wounds ...	5	18	...	...	22	33	5	6	8·6	34·8	...	...	24·7	34·6	6·9	9·0	89	15·2	1·7
Invalided on account of wounds ...	7	15	...	...	12	23	1	6	12·0	29·0	...	...	13·4	24·1	1·4	9·0	64	11·0	1·3
Invalided on account of disease ...	104	73	242	96	209	190	155	157	178·7	140·9	245·4	188·2	234·3	199·4	213·8	234·3	1.226	210·1	23·8
Discharged time-expired ...	87	179	324	31	127	34	279	68	149·5	345·6	328·6	60·8	142·4	35·7	384·8	101·5	1,129	193·4	21·9
Purchased their discharge ...	21	25	10	8	12	25	24	6	36·1	48·3	10·2	15·7	13·4	26·2	33·1	9·0	131	22·4	2·5
Transferred to other regiments ...	120	12	217	130	92	339	96	147	206·2	23·1	220·1	254·9	103·2	355·7	132·4	219·4	1,153	197·6	22·3
Removed for other reasons ...	6	...	...	1	...	...	5	...	10·3	...	...	2·0	...	...	6·9	...	12	2·1	·2
AGGREGATE LOSS ...	504	468	912	452	697	871	668	588	866·0	903·5	925·0	886·3	781·4	913·9	921·4	877·7	5,160	884·2	100·0
Remain with the Regiment ...	78	50	74	58	195	82	57	82	134·0	96·5	75·0	113·7	218·6	86·1	78·6	122·3	676	115·8	...
CAME TO INDIA ...	582	518	986	510	892	953	725	670	1000·0	1000·0	1000·0	1000·0	1000·0	1000·0	1000·0	1000·0	5,836	1000·0	...

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* Excluding the B. Battery, the return for which is incorrect, and the G. Battery, which served for five years of the period in China and Japan.

† Not stated.

How twelve years of service in India tells upon a body of British soldiers, traced from the time when it lands in the country until its return to England.

The final table shows what has been in eight regiments the result of twelve years of Indian Service, among the men who landed with the regiment when it came to India. The aggregate of the body on landing was 5,836; out of this body, 676 men embarked for England with the regiments on their return. The loss amounted to 5,160, and was made up thus—died 1,356, killed in action 89 and invalided on account of wounds 64, invalided for disease 1,226, discharged time-expired 1,129, purchased their discharge 131, transferred to other regiments or removed otherwise 1,165. In the thousand, 469 died or were invalided, 193 were discharged time-expired, 200 were transferred, 22 purchased their discharge, and 116 remain with the regiment. And the percentage of loss was made up in the following proportion: death and invaliding 53, discharged time-expired 22, transfers 22, and purchase of discharge 3, out of each hundred who came to India.

AGGREGATE STATISTICS OF NEWLY-ARRIVED TROOPS IN THE FIRST AND SECOND YEARS OF INDIAN SERVICE.

NEWLY-ARRIVED REGIMENTS IN THE FIELD, 1858.

ggregate of the Sickness and Mortality among the European Troops employed on Field Service in the Gangetic Provinces, and in Oude and Rohilcund during the Year.)

(The Army of Central India was not on the Strength of the Bengal Presidency in 1858, and is not included in this Statement).

NTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths from Disease.* Cholera.	Smallpox.	Fevers.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	All other Causes.
y ...	26,234	2,170	82·7	85	3·24	3	2	13	...	1	33	7	11	10	...	3	2
y ...	27,001	2,001	74·1	54	2·00	...	1	15	2	...	17	8	4	1	1	4	1
...	28,304	2,419	85·2	101	3·56	5	5	28	1	...	37	8	5	5	...	...	7
...	29,507	3,353	113·7	249	8·44	5	29	86	9	...	75	23	11	2	...	4	5
...	30,663	4,214	137·4	818	26·68	8	28	173	415	5	110	26	17	8	1	3	24
...	28,824	4,526	157·0	398	13·81	1	6	80	177	...	66	20	18	12	3	3	12
...	29,867	4,198	140·6	206	6·90	6	...	46	40	3	56	12	24	4	1	4	10
...	30,376	4,348	143·1	287	9·45	7	...	42	3	1	160	29	23	5	1	7	9
er ...	31,145	4,786	153·7	363	11·66	2	...	64	15	2	185	42	29	6	...	5	13
...	31,535	4,335	137·5	247	7·83	2	...	60	2	4	102	33	19	6	2	7	10
er ...	31,130	3,110	100·0	148	4·76	...	...	32	1	...	53	12	20	10	1	5	14
r ..	34,868	2,916	83·6	123	3·53	2	...	18	1	1	53	9	19	8	2	3	7
						41	71	657	666	17	947	229	200	77	12	48	114
						Died per 1,000 of the Average Strength.											
year ...	29,962	3,531	117·8	3,079	102·76	1·37	2·37	21·93	22·23	·57	39·25		6·67	2·57	·40	1·60	3·80

S OF ADMISSIONS.	Number of Admissions into Hospital in each Month. Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	For the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
...	5	2	22	17	18	14	19	21	20	5	2	5	150	5·0	27·33
x ...	...	10	27	145	56	39	7	...	...	...	...	8	292	9·7	24·32
ntermittent ..	706	836	1,710	3,672	5,908	6,547	5,190	5,011	4,146	3,458	1,675	1,090	39,949	1333·3	1·64
emittent ...															
ontinued ...															
y ...	1	3	5	14	911	536	135	21	28	9	2	6	1,671	55·8	39·85
n Tremens ...	13	5	5	5	12	18	27	19	21	28	19	13	185	6·2	9·19
ry ...	264	234	312	587	448	398	494	1,221	1,033	907	558	485	6,941	231·7	13·64
a ...	386	360	704	894	933	677	948	1,393	1,094	834	464	408	9,095	303·5	2·52
is ...	68	92	118	138	149	189	169	205	235	282	217	201	2,066	69·0	9·68
tory Diseases ..	200	241	218	259	197	184	233	232	189	231	260	320	2,767	92·3	2·78
Pulmonalis ...	5	10	6	7	14	30	27	19	16	21	14	10	179	6·0	26·81
tism ...	120	185	179	170	123	125	210	208	174	227	195	255	2,171	72·4	·51
l Diseases ...	512	554	622	526	480	485	660	712	678	836	861	1,181	8,107	270·6	
seases ...	89	167	208	190	116	143	204	226	151	212	151	199	2,056	68·6	
and Ulcer ...	280	316	400	410	540	539	677	579	510	496	370	408	5,525	184·4	
and Accidents ...	488	418	876	524	386	236	256	279	238	352	397	413	4,863	162 3	
r Causes ...	268	315	374	474	724	766	795	782	659	703	449	509	6,818	227·6	
	3,405	3,748	5,786	8,032	11,015	10,926	10,051	10,928	9,192	8,601	5,634	5,514	92,835		
	Admitted per 1,000 of the Average Strength in each Month.														
	129·8	138·8	203·8	272·2	359·2	379·1	336·5	359·8	295·1	272·8	181·0	158·1	3098·4		

This Table provides an estimate of the loss from disease likely to follow the employment in the field of a newly-landed army. All deaths from violence are excluded. The here given does not, however, show the full extent of the loss arising from exposure in the field; for in the hospitals at Calcutta 226 men died, and of those deaths upwards lf were caused by disease contracted in Upper India.

NEWLY-ARRIVED REGIMENTS IN CANTONMENTS, 1864 TO 1869.

(The aggregate of the Sickness and Mortality, during the first twelve months of their residence in India, of the Regiments and Batteries which have arrived from Europe from 1864 *to* 1869 *inclusive).*

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.*	Causes of Deaths. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	Suicide.	
January ...	14,015	673	48·0	22	1·36	3	2	...	3	...	...	...	...	3	...	1	1	3	1	...	...	2	...	
February ...	14,567	692	47·5	12	·82	...	...	...	5	...	...	1	...	...	...	...	2	1	...	...	...	2	...	
March ...	14,681	722	49·1	25	1·50	3		...	6	1	...	6	...	3	...	2	2	...	...	...	...	...	...	
April ...	14,566	836	57·4	39	1·44	18	...1	...	9	2	...	2	...	4	...	2	1	...	...	...	...	...	...	
May ...	14,507	896	61·8	48	3·17	2	...	...	19	15	1	1	1	4	...	1	1	1	...	...	...	...	1	
June ...	14,374	1,082	75·3	106	7·23	2		...	21	65	4	1	...	2	...	3	2	3	...	...	...	1	1	
July ...	14,350	1,038	72·3	47	2·51	11	...	...	5	19	...	5	...	3	...	3	...	1	...	...	...	...	...	
August ...	14,228	1,067	75·0	118	4·22	58	...	...	16	11	1	9	1	6	...	1	...	8	...	...	...	1	1	
September ...	14,084	1,136	80·7	172	3·69	120	...	...	18	4	1	10	...	6	...	1	1	8	...	...	...	...	1	
October ...	13,987	1,134	81·1	39	2·64	2	...	...	6	...	1	9	...	10	...	3	2	3	...	...	...	...	...	
November ...	13,990	921	65·8	38	2·57	2	...	1	10	...	1	4	1	11	...	2	...	3	...	...	1	...	...	
December ...	14,290	791	55·4	22	1·47	1	...	...	2	...	...	6	...	1	...	1	1	3	1	...	...	2	...	
						222	4	1	120	117	9	54	3	53	...	20	13	34	2	...	1	8	4	
						Died per 1,000 of the Average Strength.																		
For the year	14,301	916	64·0	688	48·10	15·52	·28	8·46		8·18	·63	3·77	·21	3·71	...	1·40	·91	2·38	·14	...	·07	·56	·28	1·

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month. Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died ou of eacl hundre treated
Cholera	4	...	3	23	2	3	13	77	137	2	2	1	267	18·7	83·
Smallpox	9	3	7	5	12	6	...	...	...	...	...	2	41	3·1	9·
Fever, Intermittent .	113	113	65	81	56	74	34	139	244	332	434	317	2,002	140·0	·
„ Remittent and Continued	76	90	172	476	688	1,353	761	673	490	414	207	91	5,491	383·9	2·
Apoplexy	...	...	3	3	24	120	25	60	6	...	...	...	241	16·8	48·
Delirium Tremens ...	5	3	3	3	4	5	...	2	5	9	6	6	51	3·6	17·
Dysentery	40	45	53	48	55	66	86	129	149	130	81	65	947	66·2	5·
Diarrhœa	134	93	156	294	171	132	142	330	388	166	90	94	2,190	153·1	·
Hepatitis	28	25	30	21	36	58	41	58	57	53	50	52	509	35·6	10·
Spleen Disease... ...	...	...	3	1	1	2	3	3	3	2	...	...	18	1·2	...
Respiratory Diseases . .	136	90	120	135	166	102	68	95	75	100	81	81	1,249	87·3	1·
Phthisis Pulmonalis ...	7	4	8	11	20	21	20	15	26	27	8	8	175	12·2	19·
Scurvy	2	2	...	...	...	...	...	...	...	1	...	...	5	·4	·
Rheumatism... ...	72	58	42	68	62	61	65	54	54	67	69	61	733	51·2	
Venereal Diseases ...	347	287	291	256	285	255	185	249	268	330	328	286	3,367	235·4	
Eye Diseases ..	48	34	36	37	52	51	55	90	87	62	53	33	633	44·3	
Abscess and Ulcer ...	158	115	173	177	176	227	238	203	184	140	134	88	2,013	140·7	
Wounds and Accidents ...	128	94	114	74	75	76	45	78	70	73	97	122	1,046	73·1	
All other Causes ...	161	132	180	209	231	279	248	258	254	212	157	134	2,455	171·6	
	1,463	1,188	1,459	1,922	2,116	2,891	2,029	2,513	2,497	2,120	1,797	1,441	23,436		
	Admitted per 1,000 of the Average Strength in each Month.														
	104·4	81·6	99·4	131·9	145·8	201·1	141·4	176·6	177·3	151·6	128·4	100·8	1638·4		

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* In the monthly ratios Cholera is excluded.

NEWLY-ARRIVED REGIMENTS IN THEIR SECOND YEAR OF SERVICE, 1865—70.

(Continuation of the Statistics of the body represented in the preceding Table; this Table is to be studied in contrast with that which precedes).

ONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.*	Causes of Deaths.																		
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	Suicide.	All other Causes.
ary ...	14,495	794	54·8	19	1·31	...	2	...	4	...	1	..	...	2	...	1	1	3	1	...	...	3	...	1
uary ...	14,478	777	53·7	7	·48	...	...	1	2	...	...	...	...	1	...	1	1	1	...	...	...	...	...	...
h ...	14,710	757	51·5	10	·61	1	1	...	...	...	...	1	...	1	...	1	...	1	...	...	...	...	...	4
...	14,621	851	58·2	38	2·39	3	1	...	7	2	1	4	2	8	...	2	3	1	...	...	...	2	1	1
...	14,570	993	68·1	36	1·37	16	...	...	7	...	1	3	...	4	..	...	1	3	...	...	1	...	...	...
...	14,475	1,015	70·1	28	1·93	...	1	1	3	11	1	1	...	2	...	1	3	...	...	...	...	1	1	2
...	14,439	1,000	69·3	25	1·66	1	...	1	5	7	1	1	...	1	...	...	3	2	...	...	...	2	...	1
st ...	14,426	1,026	71·1	56	2·36	22	...	...	10	6	...	3	2	4	...	...	...	4	...	...	2	1	...	2
mber ...	14,312	1,161	81·1	47	3·00	4	...	...	13	1	1	6	1	7	...	1	2	5	...	1	...	1	1	3
er ...	14,344	1,161	80·9	42	2·86	1	...	...	12	2	...	4	2	10	...	1	2	4		...	...	1	1	2
mber ..	14,081	944	67·0	29	2·06	...	...	...	6	...	...	4	...	7	...	...	1	3	...	...	1	2	2	3
nber ...	14,123	679	48·1	18	1·27	...	...	2	1	...	...	1	...	1	...	1	1	4	...	...	...	2	2	3
						48	5	5	70	29	6	28	7	48	...	9	18	31	1	1	4	15	8	22
						Died per 1,000 of the Average Strength.																		
he year ...	14,423	930	64·5	355	24·61	3·33	·35	5·20		2·01	·42	1·94	·48	3·33	...	·62	1·25	2·15	·07	·07	·28	1·04	·55	1·52

SES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
ra	...	1	2	5	19	...	3	29	4	1	...	1	65	4·5	73·85
pox	11	3	6	4	2	2	...	...	...	...	...	...	28	2·0	17·86
, Intermittent ...	144	95	118	114	122	175	203	328	741	1,100	1,321	522	4,986†	345·7†	·10
Remittent and Continued ...	45	46	99	316	567	671	417	522	314	250	115	67	3,429	237·7	2·04
lexy	...	...	2	4	6	26	11	13	1	3	1	...	67	4·6	43·28
um Tremens ...	8	4	2	10	11	6	2	3	13	7	6	5	77	5·3	7·79
tery	46	20	34	67	71	52	44	112	96	60	52	29	683	47·3	4·10
hœa	73	51	54	161	120	101	118	220	127	113	76	55	1,269	88·0	·55
titis	43	35	71	56	76	66	70	75	82	76	66	40	756	52·4	6·35
n Disease ...	2	2	..	1	3	1	9	3	6	4	3	1	35	2·4	...
ratory Diseases ...	127	72	80	81	100	98	62	83	80	74	61	75	993	68·9	·91
isis Pulmonalis ...	10	6	10	15	11	21	13	24	16	19	12	6	163	11·3	19·02
y	1	2	4	1	...	1	3	1	1	...	...	...	14	1·0	
matism... ...	65	84	95	54	73	66	85	85	88	68	77	63	903	62·6	
real Diseases ...	418	308	361	354	317	228	266	227	221	266	227	248	3,441	238·6	
Diseases ...	29	27	30	47	47	36	28	54	64	48	34	29	473	32·8	
ss and Ulcer ...	123	97	105	129	141	178	170	153	141	101	96	75	1,509	104·6	
ds and Accidents ...	114	109	135	93	101	77	72	77	79	82	87	68	1,094	75·9	
her Causes ...	149	151	205	181	234	284	250	279	219	221	175	143	2,521	174·8	
	1,408	1,113	1,413	1,693	2,021	2,089	1,826	2,288	2,326	2,493	2,409	1,427	22,506		
	Admitted per 1,000 of the Average Strength in each Month.														
	97·1	76·9	96·1	115·8	138·7	144·3	126·5	158·6	162·5	173·8	171·1	101·0	1560·4		

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* In the monthly ratios Cholera is excluded.

† The high admission-rate for fever in September, October and November is a local phenomenon, caused by the presence of Epidemic Malaria in the Punjab in 1869.

ANNUAL RETURNS

OF THE

EUROPEAN AND NATIVE ARMIES

AND OF THE

JAIL POPULATION OF THE BENGAL PRESIDENCY

FOR THE YEAR

1870.

COMPILED AND SYSTEMATICALLY ARRANGED FROM THE ORIGINAL DOCUMENTS BY

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CONTENTS.

1. EUROPEAN TROOPS.

TABLE

Sickness and Mortality among the European Troops serving in the Bengal Presidency during the year 1870, and the prevalence of the principal diseases in each month of the year I
Sickness and Mortality among the Troops serving in Bengal Proper II
Sickness and Mortality among the Troops serving in the Dinapore, Benares, Oude, and Cawnpore Districts III
Sickness and Mortality among the Troops serving in the Rohilcund and Meerut Districts ... IV
Sickness and Mortality among the Troops serving in the Agra District and in Central India ... V
Sickness and Mortality among the Troops serving in the Punjab VI
Sickness and Mortality among the Troops occupying Hill Stations VII
Sickness and Mortality among the Troops occupying the Convalescent Depôts during the Hot Season VIII
Comparative Statement of the ratios of Sickness and Mortality among the Troops serving in the various Provinces IX
General Statistics of Sickness and Mortality in the principal Military Stations X
Ratio in which the principal Diseases have contributed to make up the Admission-rate of the year in the chief Military Stations XI
The Mortality in each Station, the Causes of Death, and the Ratio of Deaths to Strength ... XII
Prevalence of Cholera in each month, and the Distribution of the Disease by Stations and Provinces... XIII
Prevalence of Smallpox in each month, and the Distribution of the Disease by Stations and Provinces XIV
Prevalence of Fevers in each month, and the Distribution of Fevers by Stations and Provinces . XV
Prevalence of Apoplexy and Sunstroke in each month, and the Distribution of these Diseases by Stations and Provinces XVI
Detail of the Causes of Death, and the Loss by Invaliding during the year XVII
Gain and Loss of the Regiments of the Army of Bengal in Strength during the year XVIII
Admissions, Deaths, and Invaliding of each Regiment and Battery for the year XIX

1.—Regiments of Bengal Proper.
2.—Regiments of Behar, Benares, Oude, and Cawnpore.
3.—Regiments of Rohilcund and Meerut.
4.—Regiments of Agra and Central India.
5.—Regiments of the Punjab.
6.—Regiments cantoned at Hill Stations.
7.—Presidency Depôt, Invalid Garrison, and Working Parties in the Hills.
8.—Convalescent Depôts.

(Annual Relief of the Army, 1870-71—follows Table XIX).

Number of Days spent in Hospital by the Men of each Regiment XX
Distribution of the Army on 1st July 1870 XXI

(An Index to the two preceding Tables).

WOMEN AND CHILDREN OF EUROPEAN REGIMENTS.

Sickness and Mortality among the Women of Regiments serving in the Bengal Presidency during the year, and the prevalence of the principal diseases in each Month I
Sickness and Mortality among the Children of Regiments serving in the Bengal Presidency during the year, and the prevalence of the principal diseases in each Month II
Distribution by Stations of the Deaths of the Women of European Regiments III
Distribution by Stations of the Deaths of the Children of European Regiments IV
Distribution by Stations of the Cholera of the Women of European Regiments V
Distribution by Stations of the Cholera of the Children of European Regiments VI
Detail of the Admissions and Deaths of the Women and Children of European Regiments ... VII

2. NATIVE TROOPS.

TABLE.

Sickness and Mortality among the Native Troops, of the Regular Army, serving in the Bengal Presidency during the year, and the prevalence of the principal diseases in each month of the year I

Sickness and Mortality among the Troops serving in Bengal Proper and in Assam II

Sickness and Mortality among the Troops serving in the Dinapore, Benares, Oude, and Cawnpore Districts III

Sickness and Mortality among the Troops serving in the Meerut District and in Rohilcund ... IV

Sickness and Mortality among the Troops serving in the Agra District and in Central India ... V

Sickness and Mortality among the Troops serving in the Punjab... VI

Comparative Statement of the ratios of Sickness and Mortality among the Regular Troops serving in the various Provinces VII

Sickness and Mortality among the Troops composing the Central India Irregular Force VIII

Sickness and Mortality among the Troops composing the Punjab Frontier Force IX

Sickness and Mortality among the Troops, Regular and Irregular, serving Trans-Indus ... X

The Daily Sick-rate of each Station in each month XI

Ratio in which the Chief Diseases have contributed to make up the Admission-rate of each Station ... XII

The Mortality in each Station, the Causes of Death, and the Ratio of Deaths to Strength ... XIII

Prevalence of Cholera in each month, and the Distribution of the Disease by Stations and Provinces... XIV

Prevalence of Fevers in each month, and the Distribution of Fevers by Stations and Provinces ... XV

Admissions, Deaths, and Invaliding of each Regiment XVI

1.—Regiments of Bengal Proper, Bhootan, and Assam.
2—Regiments of Behar, Benares, Oude, and Cawnpore.
3.—Regiments of Rohilcund and Meerut.
4.—Regiments of Agra and Central India.
5.—Regiments of the Punjab.
6.—Regiments of the Punjab Frontier Force.
7.—Regiments of the Central India Irregular Force.

Statement showing the Gain and Loss in Strength of the Regular Army—follows Table XVI.

The Statement showing the Gain and Loss of the Regiments of the Central India Force and Punjab Frontier Force, is appended to Tables VIII and IX.

Annual Relief of the Native Army, 1870-71—concludes the series of Tables for the Native Army.

Sickness and Mortality among the Troops of the Madras Army occupying Stations in the Bengal Presidency XVII

3. JAIL POPULATION.

Sickness and Mortality among the Jail Population of the Bengal Presidency during the year, and the prevalence of the principal diseases in each month of the year I

Sickness and Mortality among the Jail Population in Lower Bengal and in Assam II

Sickness and Mortality among the Jail Population in Chota Nagpore, and in the Dinapore, Benares, Oude, and Cawnpore Districts III

Sickness and Mortality among the Jail Population in the Central Provinces, excluding Jubbulpore and Saugor IV

Sickness and Mortality among the Jail Population in the Agra District and in Central India ... V

Sickness and Mortality among the Jail Population in the Rohilcund and Meerut Districts ... VI

Sickness and Mortality among the Jail Population in the Punjab VII

Comparative Statement of the ratios of Sickness and Mortality among the Jail Population in the various Provinces VIII

General Statistics of Sickness and Mortality, in each Jail, and the number Daily Sick in each month ... IX

Ratio in which the principal Diseases have contributed to make up the Admission-rate of the year in each Jail X

Prevalence of Cholera in each month, and the Distribution of the Disease by Stations and Provinces... XI

The Mortality in each Jail, the Causes of Death, and the Ratio of Deaths to Strength XII

Detail of the Admissions and Deaths of the Jail Population in each Province XIII

SUMMARY.

Detail of the Admissions and Deaths of the European and Native Armies and Jail Population of the Bengal Presidency—concludes the series of Tables for 1870.

EUROPEAN TROOPS, 1870.

EUROPEAN TROOPS, 1870.

I.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the BENGAL PRESIDENCY during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																			Died out of Hospital.
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	
January ...	33,149	1,863	56·2	51	1·54	...	...	1	4	...	1	1	4	...	12	...	8	3	2	...	...	...	1	9	5
February ...	32,354	1,832	56·6	29	·90	1	...	2	1	6	...	...	1	..	6	..	6	...	2	...	...	...	1	1	2
March ...	33,441	1,907	57·0	47	1·41	1	...	...	4	10	...	...	6	...	7	.	3	2	1	...	...	...	2	9	2
April ...	34,160	2,051	60·0	55	1·61	4	2	...	2	9	1	...	6	...	7	...	2	7	4	...	..	...	1	5	5
May ...	33,843	2,232	66·0	79	2·34	4	2	...	8	27	7	...	8	..	4	.	5	5	2	...	...	...	1	11	...
June ...	33,787	2,263	67·0	76	2·25	1	1	...	3	8	17	2	7	..	9	1	6	4	3	...	...	...	2	5	7
July ...	33,666	2,329	69·2	65	1·93	6	...	...	...	6	14	1	4	...	10	1	1	4	8	...	...	...	..	6	4
August ...	33,577	2,390	71·2	62	1·85	...	...	...	9	10	5	...	5	..	8	...	...	6	9	...	...	1	...	2	7
September ...	33,510	2,532	75·6	59	1·76	1	...	...	5	6	5	2	9	...	14	.	1	2	4	..	...	...	1	4	5
October ...	33,406	2,382	71·3	76	2·28	3	...	...	11	4	2	2	10	...	19	.	2	5	3	...	...	1		11	3
November ...	33,037	2,064	62·5	66	2·00	...	...	...	4	1	2	...	4	...	18	.	8	3	7	...	...	2	..	10	7
December ...	32,516	1,703	52·4	66	2·00	...	1	...	1	6	...	1	5	...	10	...	9	9	4	..	...	3	1	12	4
						21	6	3	47	93	54	9	69	...	124	2	51	50	49	.	..	7	10	85	51
						Died per 1,000 of the Average Strength.																			
For the year ...	33,373	2,129	63·8	731	21·90	·63	·18	4·28			1·62	·27	2·07	...	3·71	·06	1·53	1·50	1·47	...	..	·21	·30	2·54	1·53

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	...	2	2	9	3	4	19	4	1	4	1	...	49	1·5	42·86
Smallpox ...	1	3	4	1	10	1	...	...	...	...	...	1	21	·6	28·57
Fever, Intermittent ...	1,208	935	1,091	1,081	1,438	1,371	1,513	2,057	2,418	2,701	3,335	1,689	20,837	624·4	·01
„ Remittent ...	25	27	34	56	102	121	80	108	132	1[illegible]	104	51	992	210·1	2·00
„ Continued ...	55	116	205	469	1,200	674	754	755	711	544	245	112	6,020		
Apoplexy ...	1	1	1	8	18	28	21	5	8	4	5	...	100	3·0	54·00
Delirium Tremens ...	13	10	23	17	13	22	20	16	12	21	8	11	186	5·6	4·84
Dysentery ...	89	70	116	100	104	78	84	172	132	110	117	83	1,255	37·6	5·50
Diarrhœa ...	82	111	169	223	210	124	215	381	222	149	166	121	2,176	65·2	...
Hepatitis ...	119	100	165	156	204	180	173	216	175	164	145	109	1,903	57·0	6·52
Spleen Disease ...	11	10	21	10	23	15	32	28	21	18	22	13	224	6·7	·89
Respiratory Diseases ...	284	257	278	217	297	171	121	160	139	131	234	283	2,572	77·1	1·98
Phthisis Pulmonalis ...	19	16	26	32	26	33	38	29	27	28	40	24	338	10·1	14·50
Scurvy ..	4	4	3	...	4	5	3	5	2	...	4	...	34	1·0	...
Rheumatism ...	173	157	234	215	230	219	210	252	181	138	187	131	2,327	69·7	·72
Venereal Diseases ...	701	643	819	670	673	495	473	492	373	437	502	480	6,764	202·7	
Eye Diseases ...	43	61	90	77	88	48	67	116	81	82	60	43	856	25·6	
Abscess and Ulcer ...	205	172	253	253	280	202	307	270	215	196	242	175	2,836	85·0	
Wounds and Accidents ...	209	232	332	292	339	187	210	198	201	190	214	254	2,867	85·9	
All other Causes ...	253	345	517	492	612	467	561	600	402	380	431	277	5,412	163·1	
	3,525	3,272	4,443	4,384	5,970	4,505	4,910	5,870	5,543	5,458	6,062	3,857	57,790		
	Admitted per 1,000 of the Average Strength in each Month.														
	106·3	101·1	132·9	128·3	176·4	133·3	145·8	174·8	165·4	163·4	183·5	118·6	1731·9		

EUROPEAN TROOPS, 1870.

II.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in BENGAL PROPER during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS IN HOSPITAL. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
anuary ...	1,887	77	40·8	5	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	1	2
ebruary ...	2,029	92	45·3	2	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...
arch ...	2,020	108	53·5	2	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
pril ...	2,010	113	56·2	3	...	1	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...
ay ...	2,004	128	63·9	4	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	3	...
une ...	2,004	134	66·9	2	..	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...
uly ...	1,999	142	71·0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
ugust ...	2,010	143	71·1	3	...	...	...	...	...	...	..	...	1	...	1	...	...	1	...	...	...	...	...	...	...
eptember ...	2,014	136	67·5	1	...	...	...	...	...	...	...	...	...	...	...	.	...	...	...	...	...	...	...	...	1
ctober ...	1,999	138	69·0	4	..	...	...	...	...	...	...	...	1	...	3	...	..	...	...	...	...	...	..	...	...
ovember ...	2,001	102	51·0	4	...	...	...	...	...	1	...	...	...	...	1	...	...	1	...	...	...	...	...	1	...
ecember ...	1,967	100	50·8	3	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	1	...
						2	1	...	...	1	1	...	5	...	9	...	1	2	1	...	...	...	...	7	3
						Died per 1,000 of the Average Strength.																			
or the year ...	1,995	118	59·1	33	16·54	1·00	·50			·50	·50	...	2·51	...	4·51	...	·50	1·00	·50	...	...	...	...	3·51	1·51

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH. Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
Cholera	...	...	1	1	...	...	...	..	...	...	1	...	3	1·5	66·67
Smallpox ...	...	...	1	...	...	...	...	...	...	...	...	...	1	·5	...
Fever, Intermittent ...	11	17	10	9	12	7	18	28	27	11	21	31	202	101·2	...
,, Remittent ...	...	...	...	2	8	5	1	...	...	...	14	8	38	204·0	·2
,, Continued ...	12	16	16	8	31	38	65	59	41	33	20	30	369		
Apoplexy	...	...	...	1	2	2	...	...	...	..	1	...	6	3·0	16·6
Delirium Tremens ...	1	1	...	2	...	1	...	...	...	1	...	...	6	3·0	...
Dysentery	10	7	8	9	14	10	14	17	17	10	12	7	135	67·7	3·7
Diarrhœa	7	3	3	8	7	3	11	10	7	12	12	4	87	43·6	...
Hepatitis	9	4	14	9	17	13	8	16	9	23	10	10	142	71·2	6·34
Spleen Disease ..	1	...	..	1	2	...	3	1	2	1	2	...	13	6·5	...
Respiratory Diseases ...	6	5	7	2	6	5	7	11	6	5	5	4	69	34·6	1·45
Phthisis Pulmonalis ..	1	...	...	1	1	...	...	1	3	1	...	...	8	4·0	12·50
Scurvy ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..
Rheumatism... ...	5	2	10	8	8	12	10	12	7	5	10	7	96	48·1	·71
Venereal Diseases ...	23	47	54	31	40	31	28	34	24	41	38	27	419	209·5	
Eye Diseases ...	...	4	9	5	7	2	...	3	5	...	4	4	43	21·6	
Abscess and Ulcer ...	15	10	10	13	17	15	18	13	12	10	11	17	161	80·7	
Wounds and Accidents ...	21	11	26	20	14	16	9	11	8	8	10	18	172	86·2	
All other Causes ...	11	24	21	22	49	32	38	45	51	37	33	21	384	192·5	
	133	151	190	152	235	192	230	261	219	198	204	188	2,353		
	Admitted per 1,000 of the Average Strength in each Month.														
	70·5	74·4	94·1	75·6	117·3	95·8	115·1	129·8	108·7	99·0	101·9	95·6	1179·4		

EUROPEAN TROOPS, 1870.

III.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the DINAPORE, BENARES, OUDE and CAWNPORE DISTRICTS during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																			Died out of Hospital.
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	
January	6,710	406	60·5	9	...	...	...	...	...	...	1	...	1	...	3	...	1	...	...	...	...	...	...	3	...
February	6,868	389	56·7	4	...	...	...	.	...	1	...	...	...	...	2	..	...	...	...	...	...	...	1	...	...
March	7,683	433	56·4	2	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...
April	7,507	489	65·1	20	...	3	1	...	2	2	1	...	3	..	4	...	...	1	1	...	...	...	...	1	1
May	7,443	465	62·5	23	...	4	...	...	...	11	1	...	3	...	3	...	1	...	...	...	...	...	...	...	...
June	7,427	475	64·0	13	...	1	...	...	..	5	2	...	...	...	2	...	1	...	...	...	...	...	1	...	1
July	7,404	481	65·4	16	...	6	...	...	...	3	...	..	...	...	1	...	...	2	1	...	...	...	...	1	2
August	7,377	499	67·6	15	...	...	...	...	2	3	1	...	1	...	3	...	...	1	2	...	...	1	...	...	1
September	7,328	519	70·8	20	...	...	...	...	1	1	2	1	3	...	8	...	...	2	1	...	...	...	...	...	1
October	7,198	499	69·3	18	...	3	...	...	1	2	...	...	3	..	4	...	...	1	1	...	...	...	...	2	1
November	6,180	327	52·9	9	...	...	...	...	...	...	...	..	2	...	3	...	...	1	1	...	...	...	...	1	1
December	7,094	340	47·9	16	...	...	...	...	...	4	...	...	...	...	2	...	1	2	2	...	...	...	...	4	1
						17	1	...	6	33	8	1	17	...	35	...	4	10	9	...	...	1	2	12	9
						Died per 1,000 of the Average Strength.																			
For the year	7,185	444	61·8	165	22·97	2·37	·14	5·43			1·11	·14	2·37	...	4·87	...	·56	1·39	1·25	...	...	·14	·28	1·67	1·25

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	...	1	...	7	3	3	19	2	...	4	...	...	39	5·4	43·60
Smallpox	...	1	1	...	2	...	...	...	...	...	...	...	4	·6	25·00
Fever, Intermittent	54	56	77	69	101	104	125	156	151	209	203	90	1,395	194·1	...
„ Remittent	5	9	11	13	26	24	20	42	60	65	6	10	291	164·8	3·29
„ Continued	18	20	55	84	130	67	75	101	144	116	45	38	893		
Apoplexy	...	...	1	3	5	9	...	1	3	1	2	...	25	3·5	32·00
Delirium Tremens	6	2	4	5	5	5	6	2	3	4	2	3	47	6·6	2·13
Dysentery	22	19	29	32	25	17	35	51	27	27	24	21	329	45·8	5·17
Diarrhœa	17	25	63	58	48	11	38	75	38	28	36	36	473	65·8	...
Hepatitis	32	29	42	40	50	39	41	52	56	38	40	28	487	67·8	7·19
Spleen Disease	2	2	3	1	3	1	1	1	3	1	2	1	21	2·9	...
Respiratory Diseases	28	29	40	34	35	30	16	35	31	20	20	30	366	51·0	1·09
Phthisis Pulmonalis	3	...	5	8	2	8	6	7	4	2	8	5	58	8·1	15·52
Scurvy	3	3	1	...	2	1	...	2	1	...	2	...	15	2·1	...
Rheumatism	40	30	44	29	55	36	43	50	41	18	30	27	443	61·7	·47
Venereal Diseases	191	177	287	196	213	147	160	152	119	153	124	140	2,059	286·5	
Eye Diseases	11	20	23	23	30	16	32	44	20	33	20	14	286	39·8	
Abscess and Ulcer	54	40	64	56	78	66	83	79	74	67	60	41	762	106·0	
Wounds and Accidents	42	47	69	68	61	41	42	33	36	52	40	55	586	81·6	
All other Causes	52	89	121	96	126	94	119	110	100	88	94	62	1,151	160·1	
	580	598	940	822	1,000	719	861	995	911	935	767	601	9,729		
	Admitted per 1,000 of the Average Strength in each Month.														
	86·4	87·1	122·3	109·5	134·4	96·8	116·3	134·9	124·3	129·9	124·0	84·7	1354·1		

EUROPEAN TROOPS, 1870.

IV.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the ROHILCUND and MEERUT DISTRICTS during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																			
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	3,669	192	52·3	3	...	...	...	...	...	...	...	...	1	...	1	...	...	1	...	...	...	...	...	...	...
February ...	3,651	210	57·5	2	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
March ...	4,030	223	55·3	8	...	...	...	...	...	2	...	...	1	...	2	...	...	...	1	...	...	...	1	1	...
April ...	3,829	194	50·7	3	...	...	...	...	...	...	...	...	...	...	1	...	...	1	1	...	...	...	...	...	...
May ...	3,809	202	53·0	7	...	...	2	...	...	2	1	...	1	...	...	...	...	...	...	...	...	...	1	...	...
June ...	3,796	212	55·8	10	...	...	1	...	...	...	...	1	1	...	3	...	1	...	2	...	...	...	...	1	...
July ...	3,791	217	57·2	5	...	...	...	...	...	...	2	...	...	...	2	1	...	...	...	...	...	...	...	...	...
August ...	3,777	238	63·0	9	...	...	...	...	...	2	...	...	1	...	...	...	...	...	3	...	...	...	...	1	2
September ...	3,765	298	79·1	6	...	...	...	...	...	...	1	1	2	...	1	...	...	...	...	...	...	...	...	1	...
October ...	3,759	285	75·8	5	...	...	...	...	...	1	...	...	1	...	2	...	...	...	...	...	...	...	...	1	...
November ...	3,285	205	62·4	7	...	...	...	...	...	...	...	...	...	...	4	...	2	...	...	...	...	...	...	...	1
December ...	3,240	140	43·2	4	...	...	...	...	1	...	...	...	...	...	1	...	...	1	...	...	...	...	...	1	...
						...	3	...	1	7	4	2	8	...	18	1	3	3	7	...	...	...	2	6	4
						Died per 1,000 of the Average Strength.																			
For the year ...	3,700	218	58·9	69	18·65	...	·81	2·16			1·08	·54	2·16	...	4·87	·27	·81	·81	1·89	...	...	...	·54	1·63	1·08

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	...	...	1	...	...	...	...	2	...	...	...	...	3	·8	...
Smallpox	1	...	...	...	5	1	...	...	...	...	...	...	7	1·9	42·86
Fever, Intermittent ...	64	51	51	35	68	72	69	133	180	204	131	48	1,106	298·9	...
„ Remittent ...	5	2	5	20	13	5	16	28	29	14	13	4	154	120·2	
„ Continued ...	6	8	25	27	50	33	25	38	27	34	16	2	291		1·80
Apoplexy	...	...	...	...	1	...	2	...	1	...	...	...	4	1·1	100·00
Delirium Tremens ...	1	2	...	2	2	3	3	1	3	4	2	1	24	6·5	8·33
Dysentery	12	6	13	11	21	8	10	24	17	17	11	14	164	44·3	4·88
Diarrhœa	2	6	17	23	20	15	19	27	28	14	18	6	205	55·4	...
Hepatitis	6	12	26	20	24	32	18	31	29	20	17	9	244	65·9	7·38
Spleen Disease ...	1	1	3	1	3	3	4	2	1	3	3	...	25	6·7	4·00
Respiratory Diseases ..	8	19	24	11	18	18	13	20	13	5	22	18	189	51·1	1·59
Phthisis Pulmonalis ...	3	4	3	2	2	3	2	1	2	7	7	8	44	11·9	15·91
Scurvy ...	...	...	...	...	...	1	...	1	...	...	...	...	2	·5	...
Rheumatism ...	17	17	21	14	11	26	27	14	16	18	25	11	217	58·6	·48
Venereal Diseases ...	93	63	78	71	75	80	49	75	64	51	54	71	824	222·7	
Eye Diseases ...	5	4	7	9	9	6	7	10	9	10	4	3	83	22·4	
Abscess and Ulcer ...	19	19	34	31	26	28	25	21	27	29	34	14	302	81·6	
Wounds and Accidents ...	18	19	38	30	48	29	23	21	20	28	31	20	331	89·5	
All other Causes ...	37	44	59	33	49	41	57	45	58	38	48	29	533	144·1	
	298	277	405	340	445	399	369	504	534	496	431	264	4,752		
	Admitted per 1,000 of the Average Strength in each Month.														
	81·2	75·9	100·5	88·8	116·8	105·1	97·3	133·5	139·2	131·9	131·2	81·5	1284·1		

EUROPEAN TROOPS, 1870.

V.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the AGRA DISTRICT and in CENTRAL INDIA during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS IN HOSPITAL.																			
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	3,661	259	70·7	7	...	...	...	...	2	...	...	...	1	...	1	...	...	...	1	...	...	...	...	1	1
February ...	4,210	305	72·4	4	...	1	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
March ...	4,337	301	69·4	4	...	...	...	...	2	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
April ..	4,486	315	70·2	9	...	...	...	...	...	2	...	...	...	...	1	...	...	1	...	...	...	...	1	2	2
May ...	4,484	321	71·6	8	...	...	...	...	...	1	2	...	...	...	1	...	2	...	...	...	...	...	...	2	...
June ...	4,474	327	73·1	8	...	...	...	...	...	...	2	...	1	...	1	...	...	...	1	...	...	...	...	1	2
July ...	4,450	370	83·1	7	...	...	...	...	...	...	...	...	1	...	1	...	...	...	3	...	...	...	...	1	1
August ...	4,439	402	90·6	7	...	...	...	...	1	1	1	...	1	...	...	...	...	1	...	...	...	...	...	...	2
September ...	4,438	404	91·1	8	...	1	...	...	...	...	...	...	2	...	4	...	...	...	...	...	...	...	...	..	1
October ...	4,411	393	89·1	15	...	...	...	...	3	...	1	1	2	...	3	...	...	1	...	...	...	1	...	2	1
November ...	4,039	313	77·5	8	...	...	...	...	...	...	1	...	1	...	2	...	...	...	2	...	...	...	...	1	1
December ...	3,864	260	67·3	10	...	...	...	...	...	1	...	...	2	...	1	..	..	2	...	...	...	1	...	2	1
						2	...	1	9	5	7	1	11	...	16	...	2	5	7	...	...	2	1	12	14
						Died per 1,000 of the Average Strength.																			
For the year ...	4,274	331	77·5	95	22·23	·47	...	3·51			1·64	·23	2·57	...	3·74	...	·47	1·17	1·64	...	...	·47	·23	2·81	3·28

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	...	1	...	...	...	...	...	...	1	...	...	...	2	·5	100·00
Smallpox	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fever, Intermittent ...	220	231	300	256	361	306	442	552	546	531	383	258	4,386	1026·2	·02
„ Remittent ...	3	3	5	3	5	3	4	8	9	13	35	11	102	182·9	1·79
„ Continued ...	6	11	75	94	109	103	98	109	20	25	18	12	680		
Apoplexy	...	...	...	...	5	3	1	1	1	2	1	...	14	3·3	50·00
Delirium Tremens ...	...	2	2	1	...	...	...	2	3	5	3	1	19	4·4	5·26
Dysentery	7	8	14	8	6	7	2	23	27	15	21	6	144	33·7	7·64
Diarrhœa	13	17	23	18	18	13	29	50	34	26	15	11	276	64·6	...
Hepatitis	9	13	16	16	16	19	20	26	19	19	17	13	203	47·5	7·88
Spleen Disease ...	2	3	5	2	5	...	3	5	2	1	2	1	31	7·3	...
Respiratory Diseases ...	13	24	36	35	40	17	10	30	23	24	24	26	301	70·4	·66
Phthisis Pulmonalis ...	3	4	5	4	6	8	6	4	5	5	4	2	56	13·1	12·50
Scurvy	1	...	...	...	...	2	...	...	...	...	...	...	3	·7	...
Rheumatism ...	22	18	31	26	26	30	27	38	26	18	21	12	295	69·0	.70
Venereal Diseases ...	108	137	120	91	77	67	90	79	49	63	55	70	1,006	235·4	
Eye Diseases ...	10	8	13	12	11	9	6	7	8	7	5	7	103	24·1	
Abscess and Ulcer ...	22	26	40	38	56	47	38	34	19	18	28	22	388	90·8	
Wounds and Accidents ...	16	28	42	37	49	27	42	22	26	20	20	38	367	85·9	
All other Causes ...	28	42	74	59	75	57	66	75	67	52	63	38	696	162·8	
	483	576	801	700	865	718	893	1,064	885	844	715	528	9,072		
	Admitted per 1,000 of the Average Strength in each Month.														
	131·9	136·8	184·7	156·0	192·9	160·5	200·7	239·7	199·5	191·3	177·0	136·7	2122·6		

EUROPEAN TROOPS, 1870.

VI.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the PUNJAB during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	11,921	731	61·3	19	...	...	...	...	1	...	...	1	...	...	3	...	7	2	1	...	...	...	1	2	1
February ...	11,937	716	60·0	14	...	...	...	1	...	5	...	...	1	...	1	...	4	..	1	...	...	...	...	1	...
March ...	11,584	708	61·1	23	...	...	...	...	2	7	...	...	2	...	2	...	2	1	...	...	...	...	1	6	...
April ...	10,661	667	62·6	12	...	...	...	...	...	5	...	...	...	...	...	...	2	1	...	...	...	...	...	2	2
May ...	10,099	730	72·3	27	...	...	...	...	1	12	2	...	4	...	...	...	...	3	1	...	...	...	...	4	...
June ...	9,842	710	72·1	29	...	...	...	...	2	3	12	1	3	...	1	1	2	2	...	...	...	...	...	...	2
July ...	9,708	689	70·5	24	...	...	...	...	...	3	12	1	2	...	1	...	...	...	3	...	...	...	...	1	1
August ...	9,668	692	71·6	20	...	...	...	...	6	2	3	...	...	...	1	...	...	2	4	...	...	...	...	1	1
September ...	9,602	820	85·4	18	...	...	...	...	3	5	1	...	...	...	1	...	1	...	3	...	...	...	...	3	1
October ...	9,608	781	81·3	22	...	...	...	...	5	1	1	...	1	...	4	...	1	2	2	...	...	...	...	4	1
November ...	11,081	865	78·1	27	...	...	...	...	3	...	1	...	1	...	5	...	6	1	4	...	...	...	...	5	1
December ...	11,216	661	58·9	24	...	...	1	...	...	...	...	1	2	...	5	...	5	4	...	...	...	2	1	8	...
						...	1	1	23	43	32	4	16	...	24	1	30	18	19	...	...	2	3	32	10
						Died per 1,000 of the Average Strength.																			
For the year ...	10,582	731	69·1	259	24·48	...	·09	6·33			3·02	·38	1·51	...	2·27	·09	2·84	1·70	1·80	...	...	·19	·28	3·03	·95

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month. Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
Cholera ...	...	...	...	1	...	...	...	...	...	...	...	...	1	·1	...
Smallpox ...	...	2	2	1	3	...	...	...	...	...	...	1	9	·9	11·11
Fever, Intermittent ...	769	550	607	534	480	590	567	866	1,335	1,637	2,453	1,157	11,551	1091·6	·01
„ Remittent ...	12	10	11	7	42	74	25	18	25	40	11	11	295	358·7	1·74
„ Continued ...	33	56	80	235	904	387	489	413	461	317	126	20	3,501		
Apoplexy ...	1	1	...	4	5	14	18	3	1	1	1	...	49	4·6	65·31
Delirium Tremens ...	4	8	12	6	4	12	8	8	2	6	1	6	72	6·8	5·56
Dysentery ...	28	22	35	15	24	17	15	37	36	28	29	24	309	29·2	5·18
Diarrhœa ...	25	54	52	84	77	52	47	107	74	51	52	47	722	68·2	
Hepatitis ...	48	32	44	34	37	39	37	42	31	30	45	33	458	43·3	5·24
Spleen Disease ...	5	4	10	3	4	6	7	7	6	5	10	9	76	7·2	1·32
Respiratory Diseases ...	179	137	130	78	104	46	36	46	87	41	112	165	1,111	105·0	2·70
Phthisis Pulmonalis ...	5	6	9	6	10	8	17	10	6	8	13	5	103	9·8	18·45
Scurvy ...	...	1	2	...	...	1	3	3	1	...	2	...	12	1·1	...
Rheumatism ...	66	74	106	73	71	57	48	65	48	54	64	52	768	72·6	·86
Venereal Diseases ...	221	184	211	191	172	87	82	73	61	75	129	91	1,577	149·0	
Eye Diseases ...	12	23	28	14	22	8	15	46	34	27	15	9	253	23·9	
Abscess and Ulcer ...	73	68	86	78	75	78	109	97	59	47	74	49	893	84·4	
Wounds and Accidents	80	89	131	106	111	47	58	64	61	51	78	89	974	92·0	
All other Causes ...	98	122	195	190	176	169	185	235	150	100	136	92	1,848	174·6	
	1,665	1,447	1,751	1,660	2,321	1,692	1,740	2,139	2,428	2,533	3,340	1,860	24,582		
	Admitted per 1,000 of the Average Strength in each Month.														
	139·7	121·2	151·2	155·7	229·8	171·9	178·7	221·2	252·9	263·6	301·4	165·8	2323·0		

EUROPEAN TROOPS, 1870.

VII.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS occupying HILL STATIONS during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS IN HOSPITAL.																			Died out of Hospital.
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	
January ...	2,501	95	38·0	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1
February ...	2,506	84	33·5	2	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...
March ...	2,613	82	31·4	4	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	1	1
April ...	3,793	134	35·3	3	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...
May ...	4,218	192	45·5	4	...	...	...	...	1	...	...	...	...	...	...	...	...	2	...	...	...	...	...	1	...
June ...	4,284	193	45·1	6	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	1	1	2
July ...	4,290	199	46·4	4	...	...	...	...	...	...	...	...	1	...	2	...	...	1	...	...	...	...	...	...	...
August ...	4,324	215	49·7	3	...	...	...	...		...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	1
September ...	4,252	185	42·5	3	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	1
October ...	4,328	149	34·4	5	...	...	...	...	2	...	...	1	...	...	...	...	...	1	...	...	...	...	...	1	...
November ...	1,473	66	44·8	1	...	...	...	...	...	...		...	...	...	1	...	...	...	...	...	...	...	...	...	...
December ...	2,137	73	34·2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
						...	...	...	4	...	...	1	2	...	5	...	3	9	...	...	...	...	2	5	7
						Died per 1,000 of the Average Strength.																			
For the year ...	3,402	139	40·9	38	11·17	...	...	1·18			...	·29	·59	...	1·47	...	·88	2·64	...	...	...	...	·59	1·47	2·06

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	...	...	...	...	...	1	...	...	...	...	...	...		·3	...
Smallpox ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fever, Intermittent ...	18	10	14	65	210	166	157	190	123	56	23	34	1,066	313·3	...
„ Remittent ...	...	1	2	5	7	9	22	12	9	2	1	...	70	58·5	
„ Continued ...	4	2	9	10	37	21	9	12	12	8	2	3	129		2·01
Apoplexy ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Delirium Tremens ...	1	...	4	...	2	1	2	3	1	1	...	...	15	4·4	6·67
Dysentery ...	2	3	2	2	2	7	2	9	4	4	8	3	48	14·1	4·17
Diarrhœa ...	1	4	7	12	16	12	26	57	25	7	6	5	178	52·3	...
Hepatitis ...	13	5	8	16	18	20	18	15	9	9	4	3	138	40·6	3·62
Spleen Disease ...	...	...	...	...	1	...	1	...	...	3	...	...	5	1·4	...
Respiratory Diseases ...	45	37	30	36	50	29	19	18	21	13	13	18	329	96·7	·91
Phthisis Pulmonalis ...	3	1	3	2	2	1	1	4	2	2	...	1	22	6·4	...
Scurvy ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rheumatism ...	12	6	15	25	31	32	31	38	28	10	14	11	253	74·4	1·03
Venereal Diseases ...	18	22	15	53	72	35	39	51	27	26	27	26	411	120·8	
Eye Diseases ...	2	2	5	4	7	3	3	5	3	5	...	...	39	11·5	
Abscess and Ulcer ...	11	6	9	19	22	15	13	14	14	15	11	9	158	46·5	
Wounds and Accidents ...	10	27	23	29	46	25	27	38	33	26	8	12	304	89·4	
All other Causes ...	13	16	27	34	62	37	51	53	33	35	16	5	382	112·3	
	153	142	173	312	585	414	421	519	344	222	133	130	3,548		
	Admitted per 1,000 of the Average Strength in each Month.														
	61·2	56·7	66·2	82·3	138·7	96·6	98·1	120·0	79·0	51·3	90·3	60·8	1042·9		

EUROPEAN TROOPS, 1870.

VIII.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN SOLDIERS occupying the CONVALESCENT DEPOTS in the HILLS during the HOT SEASON of 1870, *and the prevalence of the principal Diseases in each Month of the period.*

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																				Died out of Hospital.
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.		
January ...	67	4	...	1	..	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	..	...	...	...	...
February ...	63	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
March ...	119	12	...	2	...	...	...	...	...	...	...	..	1	...	1	...	...	...	...	...	...	...	..	...	...
April ...	1,333	116	87·0	2	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	..	...	...	...	...	...
May ...	1,765	193	109·3	5	...	..	...	...	1	...	...	...	...	...	...	...	2	...	1	...	...	...	...	1	...
June ...	1,937	210	108·4	5	...	...	...	...	...	...	...	...	...	...	1	...	2	...	...	...	...	...	...	2	...
July ...	1,939	225	116·0	8	...	..	...	...	...	...	...	...	...	...	3	...	1	1	1	...	...	...	...	2	...
August ...	1,950	197	101·0	5	...	...	...	..	...	2	...	...	1	...	2	...	...	...	...	...	..	...	...	...	...
September ...	1,978	167	84·4	2	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...
October ..	1,923	133	69·2	7	...	...	...	...	...	...	...	...	2	...	3	...	1	...	...	...	...	...	...	1	...
November ...	1,300	78	...	5	...	...	...	...	...	...	..	...	...	...	2	...	...	...	...	...	...	2	...	...	1
December ...	784	33	...	2	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...
						...	...	...	1	2	1	...	7	...	14	...	6	1	3	...	...	2	...	6	1
						Died per 1,000 of the Average Strength.																			
For the Season...	1,945	187	96·1	44	22·62	..	...	1·54			·51	...	3·60	...	7·20	...	3·09	·51	1·54	...	...	1·03	...	3·09	·51

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admitted during the season of occupation.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	..	..	...	...	...	...	...	...	...	...	..	...	..	...	...
Smallpox	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fever, Intermittent ...	...	...	3	95	206	126	135	131	56	52	22	5	831	427·2	...
„ Remittent ...	...	...	...	3	1	1	1	...	...	...	...	...	6	61·7	2·50
„ Continued ...	...	...	1	4	28	25	13	19	5	11	5	3	114		
Apoplexy	...	...	...	...	...	..	...	...	2	...	...	...	2	1·0	50·00
Delirium Tremens ...	..	...	...	...	...	...	1	...	...	...	...	...	1	·5	...
Dysentery	...	..	7	22	12	12	6	10	3	5	2	3	82	42·2	8·54
Diarrhœa	1	...	2	20	23	17	45	36	16	10	9	3	182	93·6	...
Hepatitis	...	...	8	16	42	18	31	34	22	19	8	5	203	104·4	6·90
Spleen Disease ...	.	...	.	2	5	5	13	12	7	4	3	2	53	27·3	...
Respiratory Diseases ...	...	..	4	21	44	25	11	10	8	14	11	4	152	78·1	3·95
Phthisis Pulmonalis ...	..	...	...	7	3	5	6	2	5	3	4	1	36	18·5	8·33
Scurvy	...	..	...	...	2	...	...	...	...	...	...	...	2	1·0	...
Rheumatism ...	...	...	2	37	28	26	22	31	15	14	19	2	196	100·8	·91
Venereal Diseases ...	...	...	6	38	24	45	24	27	28	22	11	8	233	119·8	
Eye Diseases ...	...	...	1	9	2	4	4	1	2	...	1	...	24	12·3	
Abscess and Ulcer ...	1	...	1	17	12	18	20	12	10	9	6	2	108	55·5	
Wounds and Accidents	...	...	...	1	10	1	9	8	17	13	6	5	70	36·0	
All other Causes ...	1	...	6	54	73	37	43	40	30	37	25	14	360	185·1	
	3	..	41	346	515	365	384	373	226	213	132	57	2,655		
	Admitted per 1,000 of the Average Strength in each Month.														
	...	...	...	259·6	291·8	188·4	198·0	191·3	114·3	110·8	...	...	1365·0		

The Invaliding to Europe at the close of the season is shown, for the different Depôts, on the last page of Table XIX; the loss by Invaliding was at the rate of 213 per 1,000.

EUROPEAN TROOPS, 1870.

IX.

COMPARATIVE STATEMENT of the RATIOS of SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the various PROVINCES of the BENGAL PRESIDENCY during the Year 1870.

	BENGAL PROPER.	GANGETIC PROVINCES.	ROHILCUND AND MEERUT.	AGRA AND CENTRAL INDIA.	PUNJAB.	HILL STATIONS.	BENGAL PRESIDENCY.
Average Strength ...	1,995	7,185	3,700	4,274	10,582	3,402	33,373
Daily Sick-rate per 1,000	59·1	61·8	58·9	77·5	69·1	40·9	63·8
Admission-rate per 1,000	1179·4	1354·1	1284·1	2122·6	2323·0	1042·9	1731·9
Death-rate per 1,000— A. Cholera ...	1·00	2·37	...	·47	...	.	·63
Death-rate per 1,000— B. All Causes ...	16·54	22·97	18·65	22·23	24·48	11·17	21·90

DISEASES.	BENGAL PROPER.			GANGETIC PROVINCES.			ROHILCUND AND MEERUT.			AGRA AND CENTRAL INDIA.		
	Admitted per 1,000.	Died in each hundred treated.	Died per 1,000.	Admitted per 1,000.	Died in each hundred treated.	Died per 1,000.	Admitted per 1,000.	Died in each hundred treated.	Died per 1,000.	Admitted per 1,000.	Died in each hundred treated.	Died per 1,000.
Cholera ...	1·5	66·67	1·00	5·4	43·60	2·37	·8	...		·5	...	·47
Smallpox ...	·5	...	·50	·8	25·00	·14	1·9	42·86	·81	...	...	
Intermittent Fevers ...	101·2	...		194·1	...		298·9	...		1028·2	·02	·23
Remittent and Continued Fevers ...	204·0	·25	·50	164·8	3·29	5·43	120·2	1·90	2·16	182·9	1·79	3·28
Apoplexy ...	3·0	16·67	·50	3·5	32·00	1·11	1·1	100·00	1·08	3·3	50·00	1·64
Delirium Tremens ...	3·0	...		6·6	2·13	·14	6·5	8·33	·54	4·4	5·26	·23
Dysentery ...	67·7	3·70	2·51	45·8	5·17	2·37	44·3	4·88	2·16	38·7	7·61	2·77
Diarrhœa ...	43·6	...		65·8	..		55·4	...		64·6	...	..
Hepatitis ...	71·2	6·34	4·51	67·8	7·19	4·87	65·9	7·38	4·87	47·5	7·88	3·74
Spleen Disease ...	6·5	...		2·9	...		6·7	4·00	·27	7·3	...	...
Respiratory Diseases ...	34·6	1·45	·50	51·0	1·09	·56	51·1	1·59	·81	70·4	·66	·47
Phthisis Pulmonalis ...	4·0	12·50	·50	8·1	15·52	1·25	11·8	15·91	1·89	13·1	12·50	1·64
Scurvy ...	...	...		2·1	...		·5	...		·7		
Rheumatism ...	48·1	·71	4·51	61·7	·47	3·48	58·6	·48	2·97	69·0	·70	[illegible]
Venereal Diseases ...	209·5			258·5			222·7			235·4		
Eye Diseases ...	21·6			39·8			22·4			24·1		
Abscess and Ulcer ...	80·7			106·0			81·6			99·8		
Wounds and Accidents ...	86·2			81·5			89·5			85·9		
All other Causes ...	192·5			169·1			144·1			162·8		
Died out of Hospital ...	...	...	1·51	...	...	1·25	...	...	1·08	...	...	[illegible]
	1179·4	...	16·54	1354·1	...	22·97	1284·1	...	18·65	2122·6	...	22·23

DISEASES.	PUNJAB.			HILL STATIONS.			BENGAL PRESIDENCY.		
	Admitted per 1,000.	Died in each hundred treated.	Died per 1,000.	Admitted per 1,000.	Died in each hundred treated.	Died per 1,000.	Admitted per 1,000.	Died in each hundred treated.	Died per 1,000.
Cholera ...	·1	...		·3	...	..	1·5	42·86	·63
Smallpox ...	·9	11·11	·09	...	...	..	·6	28·57	·15
Intermittent Fevers ...	1091·6	·01	·09	313·3	...	..	624·4	·01	·09
Remittent and Continued Fevers ...	355·7	1·74	6·24	58·5	2·01	1·18	210·1	2·00	4·23
Apoplexy ...	4·6	65·31	3·02	...	...	...	3·0	54·00	1·62
Delirium Tremens ...	6·8	5·56	·38	4·4	6·67	·29	5·6	4·84	·27
Dysentery ...	29·2	5·19	1·51	14·1	4·17	·59	37·6	5·50	2·07
Diarrhœa ...	68·2	...		52·3	...	..	65·2	...	
Hepatitis ...	43·3	5·24	2·27	40·6	3·62	1·47	57·0	6.52	3·71
Spleen Disease ...	7·2	1·32	·09	1·4	...		6·7	·89	·06
Respiratory Diseases ...	105·0	2·70	2·84	96·7	·91	·88	77·1	1·98	1·53
Phthisis Pulmonalis ...	9·8	18·45	1·80	6·4	...	.	10·1	14·50	1·47
Scurvy ...	1·1	...	...	...	...		1·0	...	...
Rheumatism ...	72·6	·86	5·20	74·4	1·03	4·70	69·7	.72	4·55
Venereal Diseases ...	149·0			120·8			203·7		
Eye Diseases ...	23·9			11·5			25·6		
Abscess and Ulcer ...	84·4			46·5			85·0		
Wounds and Accidents ...	92·0			89·4			85·9		
All other Causes ...	174·6			112·3			163·1		
Died out of Hospital ...	...	...	[illegible]	...	...	2·06	...	...	1·53
	2323·0	...	24·48	1042·9	...	11·17	1731·9	...	21·90

EUROPEAN TROOPS, 1870.

X.

TABLE showing the GENERAL STATISTICS of SICKNESS and MORTALITY in the PRINCIPAL MILITARY STATIONS of the BENGAL PRESIDENCY.

STATIONS.	Period of Observation.	Average Strength during the period of occupation.	Daily Sick per 1,000 of the Average Strength in each Month.												Average Daily Sick per 1,000 of Strength for the period of occupation.	Admission-rate per 1,000 of Strength for the period of occupation.	Died per 1,000 of the Average Strength.			
			Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			A. Cholera.	B. All other Causes. 1. In Hospital.	B. All other Causes. 2. Out of Hospital.	C. All Causes.
Bengal Proper.																				
Fort William	... ...	875	36·1	36·5	50·8	61·4	78·5	82·1	80·0	77·8	72·3	77·0	79·5	76·0	67·4	1289·1	2·29	9·14	1·14	12·57
Dum-Dum	... ...	611	46·9	53·1	58·5	59·0	57·7	59·8	72·1	71·0	73·6	69·8	33·3	30·3	55·7	1019·7	...	14·73	3·27	18·00
Barrackpore	... ...	442	53·6	54·1	57·9	41·9	43·8	51·1	53·2	59·2	51·0	54·4	39·0	45·0	49·8	1185·5	...	22·63	...	22·63
Berhampore	6 Months, January to June ...	135	22·2	37·0	37·0	59·3	59·3	44·4	...	...	...	...	...	...	...	......	...	...	...	...
Gangetic Provinces.																				
Hazareebaugh	11 Months, unoccupied during November.	842	29·5	25·9	26·2	27·2	28·4	29·6	34·4	37.0	37·2	39·7	...	33·7	32·1	677·7	7·13	11·87	...	19·00
Dinapore	... ...	849	51·3	55·7	43·0	54·1	62·6	59·1	55·6	54·6	59·6	50·8	44·7	55·0	54·2	1197·9	3·53	24·74	3·53	31·80
Benares	... ...	524	71·9	57·8	47·4	53·8	52·0	58·4	54·8	61·1	81·6	82·0	32·4	51·2	59·2	1377·9	...	13·36	1·91	15·27
Chunar	... ...	64	49·2	82·0	29·9	74·6	89·6	45·5	30·8	46·9	32·3	36·4	61·5	71·4	54·7	2375·0	15·62*	46·88	...	62·50
Fyzabad	... ...	797	44·1	45·4	51·1	50·2	44·9	61·2	64·6	59·0	61·6	68·5	40·2	26·8	51·4	1304·9	8·78	20·08	1·25	30·11
Rae Bareilly	11 Months, January to November	65†	...	...	...	15·4	29·9	44·8	15·2	45·5	46·2	46·2	16·1	...	......	......	...	...	...	...
Lucknow	... ...	2,215	62·9	67·8	57·6	76·6	78·4	76·4	71·7	72·7	74·8	75·0	56·6	50·0	68·6	1410·8	...	23·48	1·35	24·83
Seetapore	... ...	532	39·4	37·2	62·3	63·3	59·7	61·3	54·7	47·2	55·2	44·1	18·5	20·4	47·0	1178·6	...	7·52	...	7·52
Futtehghur	... ...	226	54·2	52·4	64·7	61·1	56·8	48·2	52·6	52·6	60·9	61·4	69·9	41·5	57·5	1335·0	...	13·27	...	13·27
Cawnpore	... ...	756	104·3	96·0	107·1	117·9	85·9	87·1	115·8	137·2	151·1	138·8	67·5	60·7	108·5	1784·6	...	19·84	1·32	21·16
Allahabad	... ...	389	49·9	52·2	55·9	50·4	53·4	59·2	61·9	59·0	58·8	77·2	88·3	91·3	64·3	1578·4	...	15·42	...	15·42
Rohilcund and Meerut.																				
Shahjehanpore	10 Months, January to October ...	309	49·5	93·1	71·3	67·7	63·4	70·9	82·4	71·2	74·9	80·1	...	...	71·2	883·5	...	6·47	...	6·47
Bareilly	... ...	855	59·8	65·7	64·4	48·0	42·0	44·6	37·3	48·3	66·4	59·4	47·4	41·8	52·6	790·6	...	12·87	...	12·87
Moradabad	11 Months, January to November	309	44·2	40·7	37·8	56·1	55·7	76·9	38·3	38·3	63·4	66·9	47·9	...	45·3	812·3	...	12·94	3·24	16·18
Roorkee	... ...	316	82·8	60·2	56·0	24·5	47·3	34·7	50·5	60·9	133·6	120·5	54·8	36·9	63·3	1655·1	...	9·49	...	9·49
Meerut	... ...	1,292	45·4	52·7	52·8	55·7	60·7	65·9	74·5	73·4	80·0	78·7	76·9	50·0	65·0	1593·7	...	25·54	2·32	27·86
Delhi	... ...	339	54·1	51·3	48·6	52·8	65·4	69·2	59·7	85·4	75·7	66·2	65·7	28·6	59·0	1619·5	...	29·50	...	29·50
Muttra	... ...	357	35·0	29·6	46·5	41·7	31·4	20·0	34·3	51·4	77·4	71·6	60·1	46·6	44·8	1179·2	...	5·60	...	5·60
Agra and Central India.																				
Agra	... ...	789	51·5	56·6	48·8	62·9	70·1	71·2	88·0	83·3	60·6	46·4	46·4	59·5	62·1	1751·6	...	10·14	1·27	11·41
Morar	... ...	875	57·3	53·9	60·2	68·7	69·7	74·3	72·6	75·3	95·6	103·7	90·2	77·8	75·4	1860·6	...	26·29	5·71	32·00
Gwalior Citadel	... ...	259	66·4	62·7	47·1	62·1	58·6	44·7	53·9	74·6	85·0	93·7	96·1	74·1	69·2	1401·4	...	3·46	10·39	13·84
Seepree	7 Months, April to October ...	138	...	...	...	52·2	93·5	93·5	79·1	151·7	177·3	156·0	...	...	...	2347·8‡	...	7·25	...	7·25

Jhansi		484	138·5	101·7	80·7	74·1	81·1	85·2	113·1	121·2	135·6	143·4	81·8	69·6	99·2	2946·3‡	2·07	16·33		18·40
Nowgong		176	51·5	58·4	68·4	47·4	68·8	101·1	71·5	64·2	74·8	76·1	33·3	21·3	62·5	2181·8	...	17·05	..	17·05
Saugor		948	46·2	67·7	72·4	73·4	56·9	54·0	65·6	70·9	67·9	65·1	68·0	47·4	63·3	2031·7	..	13·71	3·17	16·88
Jubbulpore		627	129·8	113·7	105·2	88·1	92·7	93·5	112·0	129·3	113·7	108·2	99·0	94·6	106·9	2547·0	1·59	35·09	3·19	39·87
PUNJAB.																				
Umballa	... ...	1,257	31·8	46·8	50·8	47·9	59·9	55·2	52·7	47·0	63·4	64·2	53·6	37·4	51·7	1482·9	...	14·32	1·59	15·91
Jullundur	.. ..	669	78·2	60·5	55·8	49·2	50·7	88·4	110·2	115·8	132·2	95·2	91·6	82·1	83·7	2269·1	...	13·45	...	13·45
Ferozepore	. ...	962	54·6	54·6	59·9	57·0	74·3	57·1	64·7	59·7	55·7	54·8	41·1	33·5	56·1	1573·8	...	28·07	1·04	29·11
Mooltan	... .	790	81·4	57·6	53·7	39·9	49·3	60·0	61·5	60·1	65·5	56·5	37·7	23·7	53·2	1846·8	...	21·51	1·27	22·78
Dera Ismael Khan	. .	97	60·6	30·3	20·2	30·3	30·3	81·6	71·4	103·1	113·4	62·5	36·1	...	51·5	1773·2	...	20·62	10·31*	30·93
Sealkote	.. . .	967	43·3	73·9	47·6	44·5	60·6	56·7	46·9	49·1	59·2	54·2	44·5	46·0	51·7	1668·0	..	17·58	1·03	18·61
Umritsur	. . . . .	128	76·3	75·8	60·6	106·1	127·8	84·3	124·0	107·7	100·8	111·1	70·3	94·0	93·7	2703·1	...	39·06	. .	39·06
Fort Lahore	.. ..	54	51·3	50·0	50·0	49·4	49·4	38·0	50·6	25·0	36·1	72·3	48·2	14·9	47·6	2309·5	...	11·91	11·90*	23·81
Meean Meer	... .	905	86·3	95·0	84·8	104·1	91·6	101·7	93·3	83·8	90·2	76·4	108·5	45·3	88·4	2687·3	...	23·21	1·10	24·31
Rawulpindee	... .	1,454	75·3	84·9	75·3	62·5	57·1	61·8	57·7	62·7	96·9	115·7	76·5	49·5	72·2	2138·2	...	20·63	...	20·63
Campbellpore	7 Months, May to November	135	...	...	.	.	73·0	66·2	66·7	75·2	84·0	68·2	67·7	. .	......	.....	...	14·81	...	14·81
Attock	.. ..	157	63·4	20·1	26·5	39·2	46·4	33·1	53·0	60·0	54·1	81·1	106·0	49·7	53·0	2629·1	...	39·73	.	39·73
Nowshera§	... ...	485	42·0	74·1	60·0	56·3	115·0	114·0	97·8	104·9	91·5	101·8	100·5	92·0	68·7	2762·9	...	22·68	. .	22·68
Peshawur§	. .. .	1,926	75·1	52·9	64·9	73·3	95·6	56·9	78·9	87·7	115·7	105·2	139·6	119·1	92·4	4061·3	...	32·71	·52	33·23
HILL STATIONS.																				
Darjeeling	... ...	64	93·7	78·1	61·5	37·8	46·2	30·9	75·9	93·7	62·5	63·5	47·6	34·5	62·5	1990·6	...	15·62	...	15·62
Raneekhet Roads	9 Months, April to December	397	.	...	.	50·1	82·7	72·7	59·8	65·0	69·0	48·0	50·6	40·8	60·5	934·5	...	7·56	...	7·56
Chuckrata	.. ..	801	44·4	34·5	32·1	43·1	60·4	60·5	51·9	61·2	50·3	35·4	41·3	29·6	45·0	972·5	...	13·74	4·99	18·73
Dugshaie	... .	815	28·7	21·5	24·4	25·9	24·8	27·0	37·2	36·1	26·0	24·9	...	36·3	29·4	641·7	...	6·13	...	6·13
Subathoo	10 Months, January to October	518	38·7	42·4	35·8	41·1	44·2	35·9	39·5	46·5	43·0	27·4	...	...	40·3	690·7	...	7·34	2·44	9·78
Jutogh	9 Months, April to December	85	...	...	..	21·7	21·7	..	22·2	11·5	.	...	37·7	24·1	23·5	341·2	...	..	...	...
Dhurmsalla	7 Months, April to October	[illegible]	..	...	..	45·9	36·7	27·5	55·6	56·1	56·1	47·6		...	46·3	916·7	...	9·26	...	9·26
Chumba Hills	7 Months, April to October	495	...	...	. .	...	45·7	51·5	63·1	63·3	53·6	56·8	..	...	58·6	965·7	...	2·02	. .	2·02
Murree Hills	7 Months, April to October	544	...	.	...	...	36·7	51·5	38·4	35·3	32·1	29·2		.	40·4	1058·3	..	5·51	...	5·51
CONVALESCENT DEPÔTS.																				
Darjeeling	8 Months, April to November	127	.	..		147·3	100·8	125·0	117·2	87·3	103·2	95·2	103·2		110·2	1748·0	...	55·12	. .	55·12
Nynee Tal	9 Months, April to December	381	..			87·0	124·7	147·6	164·1	141·0	118·0	92·3	75·0	58·3	112·8	2058·4	...	18·37	...	18·37
Landour	8 Months, April to November	208	..			76·2	142·9	133·3	157·1	157·1	123·8	92·6	. .	..	129·8	1774·0	...	14·42	...	14·42
Kussowlie	8 Months, April to November	511		...	..	110·7	112·4	94·9	108·9	79·6	65·9	53·7	39·8	.	74·4	1252·5	. .	21·63	...	21·53
Dalhousie	7 Months, April to October	200	.	. .		70·0	165·8	145·7	145·0	144·3	123·8	90·0	..	...	125·0	1315·0	. .	10·00	5·00	15·00
Murree	6 Months, May to October	431				..	47·7	61·0	57·3	55·1	41·7	40·4	...	.	56·1	815·0	..	27·03		27·03

* The equivalent of a single death.

† Depôt of H. M.'s 55th Regiment.

‡ The 21st Regiment, sickly from the effects of residence at Nusseerabad in 1869.

§ Cherat was occupied during October and the greater part of November by a body of 592 men from Peshawur and 131 men from Nowshera. Two men died at Cherat.

EUROPEAN TROOPS, 1870.

XI.

TABLE showing the RATIO in which the PRINCIPAL DISEASES have contributed to make up the ADMISSION RATE of the YEAR in the CHIEF MILITARY STATIONS of the BENGAL PRESIDENCY.

STATIONS.	Average Strength during the period of occupation.	Admitted into Hospital per 1,000 of the Average Strength.											Admitted per 1,000 of the Average Strength from all Causes.
		Cholera.	Heat Apoplexy.	Fevers.	Dysentery.	Diarrhœa.	Hepatitis.	Rheumatism.	Venereal Diseases.	Diseases of the Respiratory Organs.	Ophthalmia.	All other causes.	
Fort William	875	2·3	1·1	418·3	75·4	36·6	77·7	37·7	196·6	24·0	16·0	403·4	1280·1
Dum-Dum	611	1·6	...	204·6	55·7	45·8	44·2	57·3	234·0	50·7	19·7	306·1	1019·7
Barrackpore	442	...	11·3	226·2	70·2	58·8	99·5	54·3	221·7	34·0	18·1	382·4	1185·5
Hazareebaugh (11 months)	842	24·9	...	260·1	32·1	39·2	21·4	29·7	172·2	41·6	26·1	230·4	877·7
Dinapore	849	4·7	9·4	189·6	83·7	83·7	113·1	102·5	253·2	63·6	24·7	209·7	1197·9
Benares	524	...	3·8	318·7	40·1	38·2	78·2	89·7	345·4	43·9	42·0	377·9	1377·0
Chunar	64	31·2*	...	609·4	78·1	100·4	140·6	171·9	484·4	15·6	...	734·4	2375·0
Fyzabad	797	13·8	...	340·0	60·0	28·9	77·8	42·7	331·2	32·6	46·4	322·5	1304·0
Lucknow	2,215	..	4·5	376·5	34·3	100·2	54·2	61·4	268·6	51·9	45·6	413·6	1410·8
Seetapore	532	...	...	293·2	28·2	35·7	20·7	107·2	282·0	52·6	35·7	323·3	1178·6
Futtehghur	226	...	4·4	663·7	17·7	75·2	26·6	39·9	92·9	13·3	22·1	420·2	1385·0
Cawnpore	756	..	...	506·6	45·0	56·9	142·9	27·8	441·8	70·1	47·6	425·9	1764·6
Allahabad	389	2·6	7·7	478·1	48·9	36·0	38·6	41·1	316·2	66·8	20·6	521·8	1578·4
Shahjehanpore (10 months)	309	...	...	80·9	48·5	13·0	51·8	55·0	307·7	9·7	45·3	281·6	893·5
Bareilly	855	...	...	138·0	31·6	24·6	60·0	29·2	253·8	25·7	12·9	205·8	700·6
Moradabad (11 months)	309	..	...	246·0	6·5	35·6	68·0	32·4	336·2	22·6	3·2	161·8	812·3
Roorkee	316	..	...	1101·3	38·0	22·1	28·5	34·8	132·9	47·5	3·2	246·8	1655·1
Meerut	1,292	1·6	1·6	489·9	61·9	108·4	75·8	82·8	169·5	72·8	38·7	490·7	1593·7
Delhi	339	...	5·9	731·6	59·0	53·1	67·8	61·9	277·3	85·6	5·9	271·4	1619·5
Muttra	357	2·8	...	248·5	22·4	11·2	50·4	72·8	243·7	53·2	11·2	423·0	1179·2
Agra	789	...	..	955·6	31·7	40·6	30·4	77·3	247·1	52·0	20·2	287·7	1751·6
Morar	875	...	1·6	987·4	43·4	65·1	58·3	53·7	172·6	50·3	84·3	390·9	1960·6
Gwalior Citadel	289	..	3·5	536·3	55·3	27·7	38·1	51·9	214·5	62·3	27·7	384·1	1401·4
Seepree (7 months)	138	...	...	1608·7	...	86·9	14·5	50·7	246·4	36·2	14·5	289·9	2347·8
Jhansi	484	2·1	8·3	1677·7	28·9	62·0	35·1	111·6	384·3	101·2	35·1	500·0	2946·3
Nowgong	176	..	5·7	1193·2	51·1	45·5	39·8	62·5	244·3	73·9	16·9	448·9	2181·8
Saugor	918	.	1·1	1243·7	13·7	41·1	54·9	51·7	193·0	100·2	10·6	321·7	2031·7
Jubbulpore	627	1·6	4·8	1550·2	46·2	143·5	62·2	81·4	242·4	57·4	16·0	341·3	2547·0
Umballa	1,257	·8	2·4	620·1	15·1	49·3	45·3	96·3	150·4	78·8	27·8	390·6	1482·0
Jullundur	669	..	6·0	1236·2	15·0	77·7	56·8	133·0	186·8	74·8	13·4	469·4	2269·1
Ferozepore	962	.	10·4	683·0	23·9	53·0	18·7	28·1	199·2	104·0	36·3	427·2	1573·8
Mooltan	790	...	2·5	981·0	53·2	43·0	64·6	84·8	83·5	94·9	30·4	408·9	1846·8
Dera Ismael Khan	97	...	10·3	1051·6	30·9	82·5	10·3	72·2	144·3	...	...	371·1	1773·2
Sealkote	967	..	6·2	800·4	25·8	71·4	63·1	61·0	170·6	43·4	42·4	383·7	1668·0
Umritsur	128	...	7·8	1375·0	31·3	78·2	78·2	54·0	328·1	46·8	15·6	687·5	2703·1
Fort Lahore	84		...	1392·9	59·5	131·0	11·9	...	333·3	59·5	...	321·4	2309·5
Meean Meer	905	.	3·3	1707·2	32·0	108·3	38·7	92·8	108·9	87·3	21·0	397·8	2597·3
Rawulpindee	1,154	...	2·1	1407·1	18·0	65·3	39·2	50·9	125·2	105·2	21·3	303·3	2138·2
Attock	151	...	...	1920·5	39·7	6·6	53·0	79·5	92·7	106·0	6·6	324·5	2629·1
Nowshera	485	...	8·3	2136·1	14·4	70·1	16·5	80·4	66·0	51·5	6·2	313·4	2762·9
Peshawur	1,9 6	...	6·2	3067·0	42·1	86·2	43·6	74·3	120·4	213·9	10·2	388·4	4001·3
Darjeeling	64	...	...	734·4	46·9	31·2	140·6	125·0	140·6	156·3	15·6	500·0	1890·6
Raneekhet Roads (9 months)	397	...	..	267·0	17·6	103·3	32·8	62·9	153·7	32·8	7·5	256·9	934·5
Chuckrata	801	1·2	...	136·1	11·2	28·7	20·0	94·9	146·1	161·0	7·5	365·8	972·5
Dugshaie	815	.	...	177·9	7·4	23·3	29·4	70·0	82·2	99·4	15·9	136·2	641·7
Subathoo (10 months)	818	.	...	251·8	18·3	36·5	48·9	25·7	56·2	61·1	11·0	182·2	690·7
Jutogh (9 months)	85	.	...	129·4	...	23·5	35·3	...	47·1	11·8	...	94·1	341·2
Dhurmsalla (7 months)	108	...	...	370·4	...	64·8	64·8	64·8	92·6	27·8	...	231·5	916·7
Chumba Hills (7 months)	495	...	...	442·4	14·1	68·7	38·4	64·7	133·3	46·5	2·0	155·6	965·7
Murree Hills (7 months)	544	..	...	702·2	1·8	38·6	12·9	49·6	57·0	33·1	11·0	152·6	1058·8
Darjeeling Depôt (8 months)	127	...	7·8	220·5	126·0	70·9	314·0	236·2	157·5	244·1	39·4	330·7	1748·0
Nynee Tal Depôt (9 months)	381	...	...	792·6	31·5	97·1	173·2	115·5	181·1	68·3	5·3	553·8	2018·4
Landour Depôt (8 months)	208	...	...	764·4	43·3	130·4	177·9	52·9	163·5	81·7	4·8	346·1	1774·0
Kussowlie Depôt (8 months)	511	...	2·0	364·0	60·7	101·8	56·7	133·1	121·3	56·7	23·5	332·7	1252·5
Dalhousie Depôt (7 months)	200	...	...	620·0	20·0	125·0	45·0	65·0	100·0	90·0	5·0	245·0	1315·0
Murree Depôt (6 months)	481	..	...	316·0	20·8	62·4	45·7	62·4	58·2	64·5	6·2	178·8	815·0

* The equivalent of two admissions.

EUROPEAN TROOPS, 1870.

XII.

TABLE showing the MORTALITY in each STATION, the CAUSES of DEATH, and the RATIO of DEATHS to STRENGTH.

STATIONS.	Average Strength for the period of occupation.	Causes of Deaths in Hospital. Cholera.	Smallpox.	Intermittent Fevers.	Remittent and Continued Fevers.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other causes.	Died out of Hospital.	Total Deaths of the Year.	Died per 1,000 of Average Strength.* A. Cholera.	B. All other causes. 1. In Hospital.	B. All other causes. 2. Out of Hospital.	C. All Causes.
Chinsurah Depôt	...																			...					
Troops marching, N. W. Provinces	...			1			...	1		2		2	...	3					5	3	17		...	...	...
Recruits and Invalids, N. W. Provinces	...				5	1	...	2		1		...	2		...						11		...	...	...
BENGAL PROPER.																									
Fort William	875	2						3		3									2	1	11	2·29	9·14	1·14	12·57
Dum Dum	611			...	...	...		2		3		1	...	1			...		2	2	11	...	14·73	3·27	18·00
Barrackpore	442		1		1	1				3			2						2		10		22·62		22·62
Berhampore (6 months)	135																...		1		1	...	..		
	1,905	2	1	...	1	1		5		9		1	2	1					7	3	33	1·00	14·03	1·51	16·54
GANGETIC PROVINCES.																									
Hazareebaugh (11 months)	842	6			4	1				...			1	2					2		16	7·13	11·87		19·00
Dinapore	849	3			2	3		4		8			1	1					2	3	27	3·54	21·71	3·53	31·80
Benares	524				3	1				3										1	8	...	13·36	1·91	15·27
Chunar	64	1					1			2											4	15·62	46·88		62·50
Fyzabad	797	7	1		6			2		4			1	1					1	1	24	8·78	20·08	1·25	30·11
Rae Bareilly (11 months)	65				1			1													2	...	30·77		30·77
Lucknow	2,215	...			20	2		5		9		2	3	4				1	6	3	55		23·48	1·35	24·83
Seetapore	532				...			1		2			1							...	4		7·52	...	7·52
Futteghur	226									2			1								3	...	13·27		13·27
Cawnpore	756				3		...	3		4			2	1		...	1	1		1	16		19·84	1·32	21·16
Allahabad	389					1		1		1		2							1	...	6		15·42	...	15·42
	7,185	17	1		39	8	1	17		35		4	10	9			1	2	12	9	165	2·37	19·35	1·25	22·97
ROHILCUND AND MEERUT.																									
Shahjehanpore (10 months)	309							1										1			2		6·47	...	6·47
Moradabad (11 months)	309									3									1	1	5		12·94	3·24	16·18
Bareilly	855							1		4	1		2					1	2	..	11	...	12·87	..	12·87
Roorkee	316							1		...				1					1		3	...	9·49		9·49
Meerut	1,292	...	3		6	2	2	4		9		2		4				...	1	3	36	...	25·54	2·32	27·86
Delhi	339				2	2		1		1		1	1	1					1		10		29·50	...	29·50
Muttra	357	...							...	1				1		...					2	...	5·60	..	5·60
	3,700	..	3		8	4	2	8		18	1	3	3	7			..	2	6	4	69		17·57	1·08	18·65
AGRA AND CENTRAL INDIA.																									
Agra	789			...	2			1		1		1	1	1					1	1	9		10·14	1·27	11·41
Morar	875				1	2		3		7		1	2	2					5	5	28	...	26·29	5·71	32·00
Gwalior Citadel	289			..				..	...	...			1							3	4		3·46	10·38	13·84
Seepree (7 months)	138															...	..	...	1	..	1		7·25	...	7·25
Jhansi	481	1			2	2	1	1	..	2										..	9	2·07	16·63	...	18·71
Nowgong	176				1	1											..	1			3		17·05	...	17·05
Saugor	948			1	3			1		2				1					2	3	16	...	13·72	3·16	16·88
Jubbulpore	627	1			5	2		5		4			1				2		3	2	25	1·59	35·09	3·19	39·87
	4,274	2		1	14	7	1	11		16	..	2	5	7			2	1	12	11	95	·47	18·48	3·28	22·23
PUNJAB.																									
Umballa	1,257				1	3				4		1	1	5					3	2	20		14·32	1·59	15·91
Jullundur	669				2	2	1					2						..	2		9		13·45	...	13·45
Ferozepore	962			...	3	8		1		3		2	5				...	1	4	1	28	...	28·07	1·04	29·11
Mooltan	790				3	2	1	2		2	...	4							3	1	18		21·51	1·27	22·78
Dera Ismael Khan	97				1	1				...								...		1	3		20·62	10·31	30·93
Sealkote	967	..			2	2	1	1		3			1	5					2	1	18		17·58	1·03	18·61
Umritsur	128				2						...		1						2		5		39·06	...	39·06
Fort Lahore	84				...					1		...				...				1	2		11·90	11·90	23·81
Meean Meer	905				10	2		1		1		1	2	1					3	1	22		23·20	1·11	24·31
Rawul Pindee	1,454			1	13	1		1		4		1	1	2			1		5		30		20·63	...	20·63
Campbellpore (7 months)	135											2			...						2		14·81	...	14·81
Attock	151				2					1								1	2		6	..	39·73	...	39·73
Nowshera	485		..		3	2				...	1	2	1			...			2		11		22·68	...	22·68
Peshawur	1,926	..	1		20	9	..	9		3	...	10	3	4		...	1	1	2	1	64	..	32·71	·52	33·23
Troops marching (Punjab)	...				1		1	1		2		5	1						2	1	14		...	...	...
Recruits and Invalids (Punjab)	...				3				...				2	2							7		...	...	...
	10,582		1	1	66	32	4	16	..	24	1	30	18	19		...	2	3	32	10	259	..	23·53	·95	24·48
HILL STATIONS.																									
Darjeeling	64									1											1		15·62	...	15·62
Raneekhet Roads (9 months)	397				..			1		...		...	...					1	1		3		7·56	...	7·56
Chuckrata	801				1			1					7				...		2	4	15		13·74	4·99	18·73
Dugshaie	815				...	...	...			1		3	1								5		6·13	...	6·13
Subathoo (10 months)	818				2					2		...	1						1	2	8		7·33	2·45	9·78
Jutogh (9 months)	85				...	...	...			...	...							...	...					...	...
Dhurmsalla (7 months)	108			...						1	...	...									1		9·26	..	9·26
Kangra (3 months)	40				..	...				...	...	...	...	...		...	...			1	1		...	...	...
Chumba Hills (7 months)	495				1		...			...	...	...									1	...	2·02	..	2·02
Murree Hills (7 months)	544				..	..	1			..								1	1		3	...	5·51	..	5·51
	3,402*				4		1	2		5		3	9					2	5	7	38		9·11	2·06	11·17*
CONVALESCENT DEPÔTS.																									
Darjeeling (8 months)	127				..	...		1	...	6			...							...	7		55·12		55·12
Nynee Tal (9 months)	381		..		...			2		3			1	...			1	..	...		7		18·37	..	18·37
Landour (8 months)	208				..					1		2									3		14·42	..	14·42
Kussowlie (8 months)	511				...	1	...	1	...	2	..	2	...	2		...	1		2		11		21·53	..	21·53
Dalhousie (7 months)	200				1					...									1	1	3	..	10·00	5·00	15·00
Murree (6 months)	481				2	..	...	3		2	..	2	...	1			...		3		13		27·03	...	27·03
	1,954†				3	1	...	7	..	14	..	6	1	3			2	..	6	1	44		22·11	·51	22·62†
BENGAL PRESIDENCY ..	33,373	21	0	3	140	54	9	60	...	124	2	51	50	40	..	..	7	10	85	51	731	·63	19·74	1·53	21·90

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* As for the year.

† Strength and Ratio for the season of occupation.

EUROPEAN TROOPS, 1870.

XIII.

TABLE showing the PREVALENCE of CHOLERA in each MONTH, and the DISTRIBUTION of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the period of observation.	Number of Admissions into Hospital in each Month. Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Total Admissions of the Year.	Admission rate per 1,000 Strength.	Number of Deaths.	Death-rate per 1,000 of Strength.
Chinsurah Depôt	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Troops marching, N. W. P.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Recruits and Invalids, N. W. P.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bengal Proper.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fort William	875	...	...	1	1	...	...	...	...	...	...	...	...	2	...	2	...
Dum-Dum	611	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...
Barrackpore	442	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Berhampore (8 months)	135	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	1,095	...	...	1	1	...	...	...	...	...	...	1	...	3	1·5	2	1·80
Gangetic Provinces.																	
Hazareebaugh (11 months)	842	...	...	...	...	...	...	18	2	...	1	...	...	21	...	6	...
Dinapore	849	...	...	...	...	...	...	1	...	...	3	...	...	4	...	3	...
Benares	524	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chunar	64	...	...	...	...	...	2	...	...	...	...	...	...	2	...	1	...
Fyzabad	797	...	...	...	7	3	1	...	...	...	...	...	...	11	...	7	...
Rae Bareilly (11 months)	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lucknow	2,215	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Seetapore	532	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Futtehghur	226	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cawnpore	756	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Allahabad	389	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...
	7,185	...	1	...	7	3	3	19	2	...	4	...	...	39	5·4	17	2·37
Rohilcund and Meerut.																	
Shahjehanpore (10 months)	309	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bareilly	855	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Moradabad (11 months)	309	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Roorkee	316	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meerut	1,202	...	...	1	...	...	...	...	1	...	...	...	...	2	...	...	...
Delhi	339	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Muttra	357	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...
	3,700	...	...	1	...	...	...	...	2	...	...	...	...	3	·8	...	...
Agra and Central India.																	
Agra	789	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Morar	875	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gwalior Citadel	280	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Seepree (7 months)	138	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jhansi	484	...	...	...	...	...	...	...	...	1	...	...	...	1	...	1	...
Nowgong	176	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Saugor	948	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jubbulpore	627	...	1	...	...	...	...	...	...	...	...	...	...	1	...	1	...
	4,274	...	1	...	...	...	...	...	...	1	...	...	...	2	·5	2	·47
Punjab.																	
Umballa	1,257	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...
Jullundur	680	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ferozepore	962	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mooltan	790	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dera Ismael Khan	97	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sealkote	967	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Umritsur	128	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fort Lahore	84	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meean Meer	905	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rawul Pindee	1,454	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Campbellpore (7 months)	135	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attock	151	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowshera	485	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Peshawur	1,926	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Troops marching (Punjab)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Recruits and Invalids (Punjab)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	10,582	...	...	...	1	...	...	...	...	...	...	...	...	1	·1	...	...
Hill Stations.																	
Darjeeling	64	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Raneekhet Roads (9 months)	397	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chuckrata	801	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...
Dugshaie	815	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Subathoo (10 months)	818	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jutogh (9 months)	85	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dhurmsalla (7 months)	104	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kangra	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chumba Hills (7 months)	495	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree Hills (7 months)	544	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	3,402	...	...	...	...	...	1	...	...	...	...	...	...	1	·3	...	...
Convalescent Depôts.																	
Darjeeling (8 months)	127	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nynee Tal (9 months)	341	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Landour (8 months)	208	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kussowlie (8 months)	51[illegible]	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dalhousie (7 months)	200	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree (6 months)	481	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	1,945	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bengal Presidency	33,373	...	2	2	9	3	4	19	4	1	4	1	...	49	1·5	21	·63

EUROPEAN TROOPS, 1870.

XIV.

TABLE showing the PREVALENCE of SMALLPOX in each MONTH, and the DISTRIBUTION of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the period of observation.	Number of Admissions into Hospital in each Month.												Total Admissions of the Year.	Admission-rate per 1,000 of Strength.	Number of Deaths.	Death-rate per 1,000 of Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Chinsurah Depôt ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Troops marching, N. W. P.	...	...	...	...	...			...	...	...	...	...	...	...		...	...
Recruits and Invalids, N. W. P.	...	...	...	...	...	...	...	...	...	...	...	...			...	...	...
Bengal Proper.																	
Fort William ...	875		...	...	...	...	...	...	...	...	...	...		...	...	...	...
Dum-Dum ...	611	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Barrackpore ...	442	...	...	1	...	...	...	...		...	...	...	...	1	...	1	...
Berhampore (6 months)	135	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	1,995	...	...	1	...	...	...	...	...	...	...	...	...	1	·5	1	·50
Gangetic Provinces.																	
Hazareebaugh (11 months) ..	842	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dinapore ..	849	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Benares	524	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chunar ..	64	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fyzabad ...	797	...	...	1	...	...	...	...	...	...	...	...	...	1	...	1	...
Rae Bareilly (11 months)	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lucknow	2,215	...	...	...	...	2	...	...	...	...	...	...	...	2	...	...	...
Seetapore	532	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Futtehghur	226	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...
Cawnpore ...	758	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Allahabad	389	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	7,185	...	1	1	...	2	...	...	...	...	...	...	...	4	·6	1	·14
Rohilcund and Meerut.																	
Shahjehanpore (10 months) ..	309	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bareilly ...	855	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Moradabad (11 months)	309	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...
Roorkee ..	316	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meerut ..	1,292	1	...	...	...	5	...	...	...	...	...	...	...	6	...	3	...
Delhi ...	339	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Muttra ..	357	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	3,700	1	...	...	...	5	1	...	...	...	...	...	...	7	1·9	3	·81
Agra and Central India.																	
Agra	780	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Morar ..	875	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gwalior Citadel ..	280	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Seepree (7 months) ..	138	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jhansi ..	484	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowgong	176	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Saugor	948	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jubbulpore	627	...	...	...	...	...	...	...	...	...	...	...	...	...	...		...
	4,274	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Punjab.																	
Umballa ...	1,257	...	...	2	1	...	...	...	...	...	...	...	...	3	...	...	...
Jullundur ...	669	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ferozepore ...	962	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mooltan ...	790	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dera Ismael Khan ...	97	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sealkote ...	967	...	2	...	...	...	...	...	...	...	...	...	...	2	...	...	...
Umritsur	128	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fort Lahore	84	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meean Meer	905	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rawul Pindee	1,454	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Campbellpore (7 months) ...	135	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attock ..	151	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowshera ...	485	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...
Peshawur ...	1,026	...	...	...	...	2	...	...	...	...	...	...	1	3	...	1	...
Troops marching (Punjab) ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Recruits and Invalids (Punjab)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	10,582	...	2	2	1	3	...	...	...	...	...	...	1	9	·9	1	·09
Hill Stations.																	
Darjeeling ...	64	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Raneekhet Roads (9 months) ...	397	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chuckrata ...	801	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dugshaie ...	815	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Subathoo (10 months) ..	818	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jutogh (9 months) ...	85	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dhurmsalla (7 months) ...	108	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chumba Hills (7 months) ...	405	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree Hills (7 months) ...	544	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	3,402	...	...	...	...	...		...	...	...	...	...	...	...	...	...	...
Convalescent Depôts.																	
Darjeeling (8 months) ..	127	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nynee Tal (9 months)	381	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Landour (8 months) ..	208	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kussowlie (8 months) ...	511	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dalhousie (7 months) ..	200	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree (6 months) ...	481	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	1,945	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bengal Presidency ...	33,373	1	3	4	1	10	1	...	...	...	...	...	1	21	·6	6	·18

EUROPEAN TROOPS, 1870.

XV.

TABLE showing the PREVALENCE of FEVERS in each MONTH, and the DISTRIBUTION of FEVERS by STATIONS and PROVINCES.

STATIONS.	Average Strength for the period of observation.	Number of Admissions into Hospital in each Month.												Total Admissions of the Year.	Admission-rate per 1,000 of Strength.	Number of Deaths.	Death-rate per 1,000 of Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Chinsurah Depôt ...	...	1	...	...	...	1	..	.	5	1	1	2	...	11	...	...	...
Troops marching, N. W. P.	...	70	10	6	...	...	...	...	..	...	...	133	76	304	...	1	...
Recruits and Invalids, N. W. P.	...	1	6	27	28	...	...	..	...	..	...	1	1	64	...	5	..
BENGAL PROPER.																	
Fort William ...	875	11	18	10	5	32	35	67	69	35	28	19	28	306	418·3	...	...
Dum-Dum ..	611	10	6	...	6	7	6	8	10	16	11	23	22	125	204·6	...	...
Barrackpore ...	442	2	7	2	6	6	6	9	8	17	5	13	19	100	226·2	1	...
Berhampore (6 months)	135	...	2	5	2	6	3	...	...	...	...	...	...	18	...	...	.
GANGETIC PROVINCES.	1,995	23	33	26	19	51	50	84	87	68	44	55	60	600	305·2	1	·50
Hazareebaugh (11 months)	842	5	10	12	8	8	10	14	37	43	49	...	23	210	260·1	4	..
Dinapore ..	849	9	20	11	12	18	14	15	11	14	10	17	10	161	189·6	2	...
Benares	524	8	3	14	4	18	21	21	16	28	17	16	1	167	318·7	3	.
Chunar	64	2	3	2	1	3	6	2	2	3	4	3	8	39	...	...	...
Fyzabad	797	...	13	20	18	30	32	30	36	30	39	20	3	271	340·0	6	...
Rae Bareilly (11 months)	65	...	1	...	1	2	2	1	1	2	2	1	...	13	...	1	...
Lucknow	2,215	26	15	33	67	124	75	98	108	93	94	65	36	834	376·5	20	...
Seetapore	532	10	2	24	20	28	15	8	15	6	7	9	3	156	293·2	...	...
Futtehghur	228	1	...	9	3	2	1	3	8	50	40	42	11	150	693·7	..	...
Cawnpore	756	8	13	13	18	14	12	18	56	83	91	38	10	383	506·6	3	...
Allahabad	389	8	5	5	5	10	7	10	9	23	37	43	24	186	478·1	..	..
ROHILCUND AND MEERUT.	7,185	77	85	143	166	257	195	220	209	355	390	254	138	2,579	358·9	39	5·43
Shahjehanpore (10 months)	300	1	2	5	1	3	3	2	4	2	2	...	...	25	80·9	...	...
Bareilly	855	8	13	20	12	13	5	3	12	6	11	10	5	118	138·0	...	...
Moradabad (11 months)	309	1	...	2	5	6	3	3	5	22	19	10	...	76	246·0	...	...
Roorkee	316	27	16	8	5	16	17	22	56	84	59	25	13	348	1101·3	...	..
Meerut	1,292	8	9	17	36	61	54	59	89	92	108	75	21	633	489·9	6	...
Delhi	339	27	20	23	14	19	10	17	23	22	29	27	8	248	731·6	2	...
Muttra	357	3	1	6	9	13	5	4	10	8	24	13	7	103	288·5	...	...
AGRA AND CENTRAL INDIA.	3,700	75	61	81	82	131	110	110	100	236	252	160	54	1,551	419·1	8	2·16
Agra	789	26	18	59	56	72	89	118	138	79	49	20	21	754	955·6	2	..
Morar	875	21	17	40	80	55	35	51	76	100	144	151	94	864	987·4	1	...
Gwalior Citadel	289	3	2	4	5	11	4	11	31	21	23	22	18	155	536·3	...	...
Seepree (7 months)	138	...	...	...	14	19	22	29	55	48	31	4	...	222	1608·7	...	...
Jhansi	484	11	42	66	33	53	44	95	115	127	113	68	45	812	1677·7	2	...
Nowgong	176	5	13	17	17	32	23	29	27	18	25	3	1	210	1193·2	1	...
Saugor	948	49	70	73	72	121	125	131	158	100	106	101	64	1,179	1243·7	4	...
Jubbulpore	627	114	83	121	76	112	70	80	69	73	78	58	38	972	1550·2	5	...
PUNJAB.	4,274	229	245	380	353	475	412	544	669	675	569	436	281	5,168	1209·1	15	3·51
Umballa	1,257	25	25	61	43	74	76	53	65	158	172	23	12	787	626·1	1	...
Jullundur	669	39	18	20	33	40	68	91	116	135	95	113	59	827	1236·2	2	...
Ferozepore	962	25	34	28	28	128	71	112	84	49	69	23	6	657	683·0	3	...
Mooltan	790	63	40	57	31	77	77	76	73	96	93	83	9	775	981·0	3	...
Dera Ismael Khan	97	10	...	1	2	12	8	5	9	22	18	14	1	102	1051·6	1	...
Sealkote ..	967	8	•27	39	41	104	82	79	105	93	99	65	32	774	800·4	2	...
Umritsur ..	128	12	4	3	7	22	20	32	25	16	14	11	10	176	1375·0	2	...
Fort Lahore	84	6	12	6	8	12	6	23	8	14	12	9	1	117	1392·9	...	...
Meean Meer	905	228	149	150	130	133	89	95	104	150	117	190	10	1,545	1707·2	10	...
Rawul Pindee ..	1,454	117	121	101	128	135	132	122	173	261	332	321	103	2,046	1407·1	14	...
Campbellpore (7 months)	135	...	...	...	...	27	15	14	16	2	3	11	...	88	...	...	...
Attock ...	151	33	6	14	19	19	9	12	11	22	40	73	32	290	1920·5	2	...
Nowshera ..	485	33	30	45	67	107	70	47	54	42	133	254	145	1,036	2136·1	3	..
Peshawur	1,926	90	106	150	239	536	319	300	454	761	808	1,379	749	5,907	3067·0	20	...
Troops marching (Punjab)	..	113	53	14	...	...	...	...	...	...	...	18	19	217	...	1	...
Recruits and Invalids (Punjab)	...	...	...	...	...	...	...	...	...	...	...	3	...	3	...	3	...
HILL STATIONS.	10,582	811	625	698	776	1,426	1,051	1,061	1,297	1,821	2,003	2,590	1,168	15,347	1450·3	67	6·33
Darjeeling	64	6	6	5	4	5	2	3	7	2	5	1	1	47	...	...	...
Raneekhet Roads (9 months)	397	...	...	...	17	38	20	15	11	2	...	1	2	106	267,0	...	...
Chuckrata	801	7	3	5	8	21	16	10	9	14	6	4	6	109	136·1	1	...
Dugshaie	815	1	3	6	2	7	9	28	22	10	9	20	28	145	177·9	...	...
Subathoo (10 months) ..	818	8	1	9	12	41	14	36	48	26	11	...	...	206	251·8	2	...
Jutogh (9 months)	85	...	...	...	2	4	1	1	2	1	...	...	...	11	129·4	...	...
Dhurmsala (7 months) ...	108	...	...	...	1	3	7	9	13	6	1	...	...	40	...	...	...
Chumba Hills (7 months)	495	...	...	..	18	56	44	37	31	21	12	...	...	219	442·4	1	...
Murree Hills (7 months) ..	544	...	..	...	16	79	83	49	71	62	22	...	...	382	702·2	...	...
CONVALESCENT DEPÔTS.	3,402	23	13	25	80	254	196	188	214	144	66	28	37	1,265	371·8	4	1·18
Darjeeling (8 months)	127	...	...	4	3	8	5	1	4	..	2	...	1	28	220·5	...	...
Nynee Tal (9 months) ..	381	...	...	...	47	73	49	48	47	11	12	11	4	302	792·6	...	...
Landour (8 months)	208	...	...	...	17	31	16	27	28	16	19	5	...	159	764·4	...	...
Kussowlie (8 months)	511	...	...	...	13	38	34	28	30	18	14	8	3	186	364·0	...	...
Dalhousie (7 months)	200	...	...	...	15	46	17	12	16	7	10	1	...	124	620·0	1	...
Murree (6 months) ..	481	...	...	...	7	39	31	33	25	9	6	2	...	152	316·0	2	.
	1,945	...	...	4	102	235	152	149	150	61	63	27	8	951	488·9*	3	1·54*
BENGAL PRESIDENCY ...	33,373	1,318	1,078	1,390	1,606	2,830	2,166	2,356	2,920	3,261	3,388	3,684	1,853	27,849	834·5	143	4·28

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* For the Season.

EUROPEAN TROOPS, 1870.

XVI.

TABLE showing the PREVALENCE of APOPLEXY and SUNSTROKE in each MONTH, and the DISTRIBUTION of the DISEASES by STATIONS and PROVINCES.

STATIONS.	Average Strength for the period of observation.	Number of Admissions into Hospital in each Month. Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept	Oct.	Nov.	Dec.	Total Admissions of the Year.	Admission-rate per 1,000 of Strength.	Number of Deaths.	Death-rate per 1,000 of Strength.
Chinsurah Depôt	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Troops marching, N. W. P.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Recruits and Invalids, N. W. P.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
BENGAL PROPER.																	
Fort William	875	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...
Dum-Dum	611	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Barrackpore	442	...	...	...	1	2	1	...	...	...	...	1	...	5	...	1	...
Berhampore (6 months)	135	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	1,995	...	...	...	1	2	2	...	...	...	...	1	...	6	3·0	1	·50
GANGETIC PROVINCES.																	
Hazareebaugh (11 months)	842	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
Dinapore	819	...	...	...	2	1	3	...	1	1	...	...	...	8	...	3	...
Benares	524	...	...	...	...	1	1	...	...	...	...	...	...	2	...	1	...
Chunar	64	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fyzabad	797	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rae Bareilly (11 months)	65	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...
Lucknow	2,215	...	...	...	1	3	4	...	...	...	1	1	...	10	...	2	...
Seetapore	532	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Futtehghur	226	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...
Cawnpore	756	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Allahabad	389	...	...	...	...	...	...	...	...	2	...	1	...	3	...	1	...
	7,185	...	...	1	3	5	9	...	1	3	1	2	...	25	3·5	8	1·11
ROHILCUND AND MEERUT.																	
Shahjehanpore (10 months)	309	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bareilly	855	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Moradabad (11 months)	309	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Roorkee	316	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meerut	1,292	...	...	...	...	...	...	1	...	1	...	...	...	2	...	2	...
Delhi	330	...	...	...	...	1	...	1	...	...	...	...	...	2	...	2	...
Muttra	357	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	3,700	...	...	...	...	1	...	2	...	1	...	...	...	4	1·1	4	1·08
AGRA AND CENTRAL INDIA.																	
Agra	789	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Morar	875	...	...	...	...	2	...	...	...	1	...	1	...	4	...	2	...
Gwalior Citadel	280	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...
Seepree (7 months)	138	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jhansi	484	...	...	...	...	2	1	...	1	...	...	...	...	4	...	2	...
Nowgong	176	...	...	...	...	...	1	...	...	...	...	...	...	1	...	1	...
Saugor	948	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...
Jubbulpore	627	...	...	...	...	1	1	...	...	...	1	...	...	3	...	2	...
	4,274	...	...	...	...	5	3	1	1	1	2	1	...	14	3·3	7	1·64
PUNJAB.																	
Umballa	1,257	...	...	...	1	...	1	...	...	...	...	1	...	3	...	3	...
Jullundur	669	...	1	...	...	...	1	2	...	...	...	...	...	4	...	2	...
Ferozepore	962	...	...	...	...	...	3	7	...	...	...	...	...	10	...	8	...
Mooltan	790	...	...	...	...	...	2	...	...	...	...	...	...	2	...	2	...
Dera Ismael Khan	97	...	...	...	...	...	...	1	...	...	...	...	...	1	...	1	...
Sealkote	967	...	...	...	1	3	1	...	1	...	...	...	...	6	...	2	...
Umritsur	128	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...
Fort Lahore	84	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meean Meer	905	...	...	...	1	...	1	1	...	...	...	...	...	3	...	2	...
Rawul Pindee	1,454	1	...	...	...	...	...	1	...	1	...	...	...	3	...	1	...
Campbellpore (7 months)	135	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attock	151	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowshera	485	...	...	...	...	...	2	2	...	...	...	...	...	4	...	2	...
Peshawur	1,026	...	...	...	1	2	3	3	2	...	1	...	...	12	...	9	...
Troops marching (Punjab)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Recruits and Invalids (Punjab)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	10,582	1	1	...	4	5	14	18	3	1	1	1	...	40	4·6	32	3·02
HILL STATIONS.																	
Darjeeling	64	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Raneekhet Roads (9 months)	397	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chuckrata	801	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dugshaie	815	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Subathoo (10 months)	818	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jutogh (9 months)	85	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dhurmsalla (7 months)	108	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kangra	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chumba Hills (7 months)	405	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree Hills (7 months)	544	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	3,402	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
CONVALESCENT DEPÔTS.																	
Darjeeling (8 months)	127	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...
Nynee Tal (9 months)	381	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Landour (8 months)	298	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kussowlie (8 months)	511	...	...	...	...	...	...	...	...	1	...	...	...	1	...	1	...
Dalhousie (7 months)	200	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree (6 months)	481	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	1,945	...	...	...	...	...	...	...	...	2	...	...	...	2	1·0	1	·51
BENGAL PRESIDENCY	33,373	1	1	1	8	18	28	21	5	8	4	5	...	100	3·0	54	1·62

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* The great majority of the cases entered in this Table are cases of Heat Apoplexy, represented by the admissions of the hot months. But as it has been found impossible correctly to separate cases of other varieties of Apoplexy, cases of Sanguineous Apoplexy and Congestive Apoplexy from Fever, Alcoholic poisoning &c., are also included. The few cases entered in the cold months may be generally regarded as cases of Congestive or Sanguineous and not of Heat Apoplexy.

EUROPEAN TROOPS, 1870.

XVII.

TABLE showing in detail the CAUSES of DEATH and INVALIDING.

TOTAL LOSS OF THE ARMY OF THE BENGAL PRESIDENCY BY DEATHS AND INVALIDING, 2,424. PER 1,000 OF AVERAGE STRENGTH, 74·40.

LOSS OF THE ARMY BY DEATH, 731.

CAUSES OF DEATH.	Died in Hospital.	Died out of Hospital.	Died per 1,000 of Strength.
Cholera	21	..	·63
Smallpox	6	.	·18
Intermittent Fevers	3	..	
Remittent and Continued Fevers	110	.	4·28
Erysipelas	2	.	
Diphtheria	1	...	
Pyæmia (following Abscess)	2	.	
Hydrophobia	2		
Secondary Syphilis	6	.	
„ Caries of Skull	3	..	
Cancer of Lower Jaw	1	...	
„ of Stomach	2	...	
„ of Abdominal Viscera	2		
„ of Face and Head	1	...	
Phthisis Pulmonalis	49	...	1·47
Anæmia	4	.	
Meningitis	4	...	
Myelitis	2	..	
Epilepsy	1		
Tetanus	2	...	
Delirium Tremens	9		·27
Encephalitis	4		
Apoplexy and Sunstroke	54	.	1·62
Hemiplegia	1	.	
„ tumour of Dura mater	1	..	
Pericarditis	5		
Heart Disease, Valvular	20		1·50
„ Hypertrophy	7	..	
„ Fatty Heart	4	.	
Aortic Aneurism	17	.	
Rupture of Aorta	1	..	
„ of Internal Jugular Vein	1	...	
Bronchitis	5	..	1·53
Asthma	1	..	
Pleurisy	1	..	
Pneumonia	43	...	
Gastritis	8	...	
Enteritis	7	...	
Ileus	3		
Peritonitis	5	...	
Pelvic Abscess	2	.	
Dysentery	69	..	2·07
Hepatitis	124	...	3·71
Cirrhosis of Liver	6	.	
Spleen Disease	2	...	·06
Disease of Supra-renal Capsules	1	...	
Nephria	13	..	
Stricture, followed by Extravasation	2	.	
Abscess of Thigh	1	...	
„ of Walls of Chest	1	...	
General Debility and Atrophy	3	.	
Accident	7	11	1·83
„ Death after Thigh Amputation	1		
Drowning	.	17	
Died from Drinking	1	7	
Rupture of Spleen	1	1	
Struck by Lightning		1	
Suicide	...	14	
Cause not ascertained	1		
Ratio per 1,000 for Deaths from causes not specially calculated ...	...†	...	2·75
	680*	51	21·90

LOSS OF THE ARMY BY INVALIDING, 1,693.

CAUSES OF INVALIDING.	Invalided for Change of Climate.	Invalided for Discharge from the Service.	Invalided per 1,000 of Strength.
Intermittent Fevers	133	7	4·84
Remittent and Continued Fevers	16	...	
Gangrene (Loss of Toes)	1	...	
Rheumatism	94	21	8·56
Secondary Syphilis	84	14	3·04
Cancer of Tongue	1	...	
„ of Scrotum	1	...	
Phthisis Pulmonalis	83	37	3·72
Scrofula	3	3	
Hip-joint Disease	...	1	
Psoas Abscess	1	...	
Anæmia	95	6	
General Dropsy	...	1	
Gout	1	...	
Goitre	...	1	
Scurvy	2	...	
Encephalitis	3	..	
Meningitis	2	...	
Myelitis	...	1	
Sunstroke and Apoplexy	8	...	·25
Paralysis	12	4	
„ Hemiplegia 4	...	...	
„ Paraplegia 2	...	...	
„ General Muscular 3	...	...	
„ Local 4	..	...	
„ Character not stated 3	...	...	
Epilepsy	18	9	·78
Mania	4	6	
Melancholia	1	...	
Dementia	2	5	
Neuralgia	5	...	
Ophthalmia	10	2	·74
Defective Vision	10	2	
Otitis	3	...	
Deafness	7	2	
Pericarditis	1	1	
Heart Disease	78	27	3·47
„ Valvular 57	...	...	
„ Hypertrophy 48	...	...	
Aneurism	5	2	
„ Thoracic Aorta 2	...	..	
„ Abdominal Aorta 3		.	
„ Innominate Artery 1	..	...	
„ Temporal Artery (Dilatation) 1	...	...	
Palpitation	35	7	
Varix	2	10	
Phlebitis	1	...	1·48
Laryngitis	1	1	
Aphonia	1	...	
Bronchitis	29	4	
Asthma	2	...	
Pleurisy	5	...	
Pneumonia	4	..	
Dyspepsia	11	1	
Dysentery	66	3	2·64
Diarrhœa	15	1	
Hepatitis	251	9	8·08
Spleen Disease	28	1	·90
Ascites	1	...	
Hæmorrhoids	4	...	
Fistula in Ano	2	1	
Stricture of Rectum	1	...	
Hernia	5	8	
Nephria	9	3	
Enuresis	1	...	
Diabetes	1	...	
Stricture of Urethra	8	4	
Varicocele	1	...	
Hydrocele	1	1	
Orchitis	1	...	
Neuralgia Testis	1	...	
Periostitis	2	...	·56
Caries of Ribs	1	1	
Synovitis	7	...	
Muscular Atrophy	1	...	
Contraction of Joints	4	2	
Abscess	3	...	·53
Ulcer	10	4	
Skin Diseases	2	...	
General Debility	215	40	11·04‡
Injuries, Fracture	3	11	·80
„ Sprain	2	1	
„ Injury of Head	3	...	
„ Amputation of Arm	...	1	
„ „ of Fingers	...	1	
„ Gunshot Wound of Hand	...	1	
„ Incised Wound of Arm	...	1	
„ Contusion	1	1	
Ratio per 1,000 for Invaliding from causes not specially calculated ...	...	...	6·11
	1,423	270	52·50†

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* For Deaths of Men of Regiments of the Bengal Army in other Presidencies, &c., see Section 7 of Table XIX.

† Calculated after excluding the strength of the 88th and 103rd Regiments, which took home their Invalids.

‡ Including Anæmia.

EUROPEAN TROOPS, 1870.

XVIII.

STATEMENT showing the GAIN and LOSS of the REGIMENTS of the ARMY of BENGAL in STRENGTH during the YEAR

		Sappers and Miners.	Artillery.	Cavalry.	Infantry.	Army of the Bengal Presidency.
Strength at the beginning of the Year.						
At Head Quarters and on Detachment at the beginning of 1870		47	5,620	2,023	24,071	31,761
Recruits from England in India on march to join		...	96	33	32	161
On Staff employment		39	18	6	34	97
In Military and other Prisons		...	22	3	168	193
Elsewhere, sick in other Hospitals and men remaining at Convalescent Depôts ...		...	106	16	566	688
Total Strength in India at the beginning of 1870 ...		86	5,862	2,081	24,871	32,900
Additions during the Year.						
Transfers received from other Regiments		2	488	14	136	640
Transferred from Regiments leaving India by volunteering	From Bengal Presidency...	...	...	65	471	536
	From other Presidencies ...	...	3	1	466	470
Recruited in India	New Soldiers ...	...	9	2	45	56
	Time-expired men ...	...	...	...	2	2
Received from England, landed after 1st January	Recruits	2	732	298	2,068	3,100
	Invalids recovered ...	...	2	31	186	219
Deserters rejoined		...	1	2	12	15
Total Additions of the Year ...		4	1,235	413	3,386	5,038
Loss during the Year.						
Transfers given to other Regiments		42	463	18	551	1,074
Time-expired men who have left the service		...	88	62	675	825
Men who have purchased their discharge		2	4	4	26	36
Men discharged otherwise		...	...	...	8	8
Invalided	For discharge ...	...	57	13	200	270
	For change of climate ...	...	324	118	981	1,423
Dismissed by sentence of Court Martial		...	13	1	56	70
Deserted		...	4	4	49	57
Died at Head Quarters and on Detachment		1	119	31	506	657
Died absent from the Regiment ...	At Convalescent Depôts ...	...	6	...	35	41
	In other Hospitals	...	7	3	23	33
Total Loss of the Year ..		45	1,085	254	3,110	4,494
Strength remaining towards the close of 1870		45	6,012	2,240	25,147	33,444

ABSTRACT.

Remained at the beginning of 1870		32,900
Added during 1870		5,038
	Total ...	37,938
Deduct Loss during 1870		4,494
Remain towards the close of 1870		33,444

EUROPEAN

X

ABSTRACT of the RETURNS showing the ADMISSIONS,

This Table must not be regarded as exhibiting with accuracy the relation of Sickness and Mortality to the localities indicated, since the Regimental Return and others which have spent a few weeks only of 1870

1.—*REGIMENTS of*

	REGIMENTS & BATTERIES, & STATION OF 1870.	YEAR OF ARRIVAL In India.	YEAR OF ARRIVAL In the Bengal Presidency.	Date of Arrival from Station previously occupied.	Average Strength during 1870.	Admissions per 1,000 of Strength.	LOSS PER 1,000 By Deaths.	LOSS PER 1,000 By Invaliding.
1	2-19th Regiment, Fort William	1863	1869	December 1869, from Madras Presidency	871	1306·5	11·48	34·44
2	XXII Brig., 3 Battery, R. Art., Fort William ...	...	...	November 1868, from Lucknow ...	66	848·5	15·15	15·15
3	96th Regiment, Dum-Dum and Barrackpore* ...	1866	1869	20th February 1869, from Bombay Presidency	872	1102·1	18·35	47·02
4	XVI Brig., A. Battery, R. Art., Barrackpore ...	...	...	January 1869, from Hazareebaugh ...	144	958·3	27·78	20·83
5	XVI Brig., B. Battery, R. Art., Barrackpore ...	...	...	January 1870, from Meerut	153	1287·6	39·22	32·68
				REGIMENTS OF BENGAL PROPER ...	2,106	1182·3	17·57	37·99

2.—*REGIMENTS OF BEHAR,*

	REGIMENTS & BATTERIES, & STATION OF 1870.	YEAR OF ARRIVAL In India.	YEAR OF ARRIVAL In the Bengal Presidency.	Date of Arrival from Station previously occupied.	Average Strength during 1870.	Admissions per 1,000 of Strength.	LOSS PER 1,000 By Deaths.	LOSS PER 1,000 By Invaliding.
1	107th Regiment, Hazareebaugh	...	...	January 1869, from Allahabad ...	887	983·1	18·04	25·93
2	3rd Battalion Rifle Brigade, Dinapore (Detachment of 65 men at Chunar), (10 months) ...	1857	1857	January 1869, from Seetapore and Moradabad	802	1077·3	37·41	67·33
3	VIII Brig., B. Battery, R. Art., Dinapore	1866	1866	December 1869, from Lucknow ...	148	1587·8	13·51	87·84
4	2-60th Regiment, Wing, Benares	1867	1867	January 1869, from Fort William ...	372	1357·5	13·44	67·20
5	F. Brig., A. Battery, R. H. Art., Benares	...	...	December 1869, from Umballa ...	136	1816·2	22·06	66·18
6	20th Regiment, Fyzabad	1865	1868	January 1870, from Fort William .	823	1164·0	30·38	46·17
7	VIII Brig., E. Battery, R. Art., Fyzabad	1868	1868	April 1868, from England	143	1112·6	20·98	76·92
8	21st Hussars, Lucknow	...	...	December 1869, from Umballa ...	440	1861·4	11·36	61·36
9	1-17th Regiment, Lucknow (11 months)	1870	1870	February 1870, from England ...	784	1265·3	35·71	10·20
10	62nd Regiment, Lucknow	1869	1869	24th February 1869, from England ...	820	918·3	23·17	26·83
11	F. Brig., C. Battery, R. H. Art., Lucknow	...	...	December 1869, from Morar	139	2295·0	7·19	93·53
12	VIII Brig., C. Battery, R. Art., Lucknow	1866	1866	February 1870, from Morar	153	1875·8	19·61	91·50
13	XXIV Brig., 3 Battery, R. Art., Lucknow	...	...	January 1869, from Morar	61	557·4	49·18	49·18
14	2-60th Regiment, Head Quarters, Seetapore ...	1867	1867	January 1869, from Fort William ...	405	1180·2		39·51

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* During the first six months of 1870, this Regiment furnished a detachment of 135 men to Berhampore. This detachment was withdrawn at the end of June, and no European detachment has since occupied this Station. The Barrackpore detachment, originally of 100 men, was in July increased to 200 men.

ROOPS, 1870.

X.

EATHS, and INVALIDING of each REGIMENT for the YEAR.

designed to include all cases of disease in men borne on the Regimental Rolls, whether absent or present with the Regiment. Newly arrived Regiments
India are not included in this Table.

BENGAL PROPER.

	Total Admissions and Loss of the Year by Death and Invaliding.	Cholera.	Smallpox.	Intermittent Fevers.	Remittent and Continued Fevers.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Erysipelas.	Scurvy.	Anæmia and Debility.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Epilepsy and other Brain Affections.	Neuralgic Affections.	Delirium Tremens.	Ophthalmia.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
	Causes of Admissions into Hospital, of Deaths in and out of Hospital, and of the Invaliding of 1870.																														
1	Admissions 1,138	3	...	96	279	29	151	16	1	1	13	3	...	2	3	3	17	1	24	...	69	32	68	9	98	6	25	75	48	...	66
	Deaths ... 10	2																													
	Invaliding ... 30						1	2				2																			6
2	Admissions 56	...	...	...	9	5	5	...	...	...	...	1	1	3	...	...	1	...	2	...	2	3	3	...	6	...	..	3	10	...	2
	Deaths ... 1																														1
	Invaliding ... 1										1																				
3	Admissions 961	...	...	89	81	35	201	19	1	...	33	5	...	3	9	4	25	6	43	4	61	39	50	5	57	4	13	64	76	...	34
	Deaths ... 16				1																3										
	Invaliding ... 11			2		3		2				1									1				1						
4	Admissions 138	...	...	21	2	7	8	7	...	...	1	1	1	...	3	...	1	3	6	1	14	8	13	...	6	...	6	10	17	...	2
	Deaths ... 4																														
	Invaliding ... 3			1							1	1																			
5	Admissions 197	...	1	27	12	8	34	9	...	...	2	...	3	1	2	...	1	1	3	1	12	12	17	...	9	..	4	11	20	.	7
	Deaths ... 6		1		1								1																		
	Invaliding ... 5										2																				
	Admissions 2,490	3	1	233	383	84	399	51	2	1	49	10	5	9	17	7	45	11	78	6	158	94	151	14	176	10	48	163	171	...	111
	Deaths ... 37	2	1		2							1	2	2					1	1											1
	Invaliding ... 50			3		3	1	1			15				2			6	1				10	1	1						5

BENARES, OUDE, and CAWNPORE.

	Total Admissions and Loss of the Year by Death and Invaliding.	Cholera.	Smallpox.	Intermittent Fevers.	Remittent and Continued Fevers.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Erysipelas.	Scurvy.	Anæmia and Debility.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Epilepsy and other Brain Affections.	Neuralgic Affections.	Delirium Tremens.	Ophthalmia.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
1	Admissions 872	26	...	46	226	20	126	23	...	3	7	12	1	11	7	4	23	1	33	6	27	32	22	...	45	3	11	48	68	...	32
	Deaths ... 16	6			2																								2		1
	Invaliding ... 23			1		2		5						3			1	1	2		1		1								3
2	Admissions 864	5	...	65	44	97	123	39	1	1	13	2	8	3	5	13	16	9	41	4	80	44	95	5	50	3	10	40	26	...	22
	Deaths ... 30	4										1	2			1		1			1		1								
	Invaliding ... 54					12		2			6	2		2			7	3	2		1	1							1		2
3	Admissions 235	1	...	54	12	7	37	4	1	...	3	...	1	...	...	2	3	4	10	1	2	20	20	..	3	...	6	12	14		9
	Deaths ... 2				1								1																		
	Invaliding ... 13		...								1	1									1								1		1
4	Admissions 505	...	...	85	56	13	96	7	...	...	10	...	...	10	...	3	15	1	24	...	16	13	49	...	22		8	45	14	...	18
	Deaths ... 5				3																										
	Invaliding ... 25			2	1	2					3			1					1		1	1	1		1						1
5	Admissions 247	...	...	21	20	20	54	4	..	...	1	...	1	6	6	2	4	...	7	2	11	5	10	2	9	.	8	26	10	..	9
	Deaths ... 3																														
	Invaliding ... 9					1							1	1							1		1								1
6	Admissions 958	11	1	216	42	24	181	60	...	7	2	5	...	1	1	5	31	1	26	...	60	18	50	2	44	1	12	61	57	...	27
	Deaths ... 25	7	1		6			1										2													1
	Invaliding ... 38	..	..	5	...	3		5		1	1	3									1							1			7
7	Admissions 202	...	...	12	27	14	49	5	...	...	2	1	...	...	...	2	5	1	6	1	...	13	7	...	18	1	...	19	10	..	9
	Deaths ... 3	...	..		1							1																			
	Invaliding ... 11			1		1	1	1														1	1								
8	Admissions 819	...	...	250	1	38	98	13	...	...	14	2	...	1	4	2	10	6	31	6	8	31	32	1	25	.	12	112	97	...	25
	Deaths ... 6				1							1						1													
	Invaliding ... 27			9	3			3				...						2					1						1		1
9	Admissions 992	...	2	2	309	48	156	8	...	...	34	...	7	...	1	1	30	2	41	4	10	114	13	..	31	1	3	105	49	..	12
	Deaths ... 28							1					1					1		1	3					1					1
	Invaliding ... 8							1			1		..	..							3		1				1				1
10	Admissions 778	...	...	20	63	18	216	2	1	...	16	9	1	1	1	3	32	7	14	6	47	54	69	...	29	3	10	85	10	...	23
	Deaths ... 19				2								1							1									5		1
	Invaliding ... 22										7						...	2	1							1					2
11	Admissions 319	...	...	84	14	9	54	9	...	...	...	...	2	3	...	..	10	11	12	1	2	19	10	1	8	...	5	17	28	...	20
	Deaths ... 1																														
	Invaliding ... 13			1									1	1				1	1				2						1		1
12	Admissions 287	...	...	90	2	14	40	6	...	...	2	...	...	2	1	1	11	1	5	2	11	20	3	..	2		4	19	30	...	6
	Deaths ... 3				1																		1								
	Invaliding ... 14							1				1		1				2													
13	Admissions 34	...	...	...	4	1	6	...	.	...	...	3	...	...	1	..	2	...	1	...	4	1	1	1	2	..	1	2	2	...	2
	Deaths ... 3				...	...								1																	
	Invaliding ... 3			...	...	...								1									1								1
14	Admissions 478	...	...	85	97	35	112	8	1	...	...	...	..	1	1	1	5	12	22	2	18	18	7	..	30	...	1	25	29	...	18
	Deaths ... None	...																													
	Invaliding ... 16			2		2	1	1			3				1			3			1		1								1

TABLE

REGIMENTS of BEHAR,

	REGIMENTS & BATTERIES, & STATION OF 1870.	YEAR OF ARRIVAL		Date of Arrival from Station previously occupied.	Average Strength during 1870.	Admissions per 1000 of Strength.	LOSS PER 1000	
		In India.	In the Bengal Presidency.				By Deaths.	By Invaliding.
15	VIII Brig., F. Battery, R. Art., Seetapore	1868	1868	April 1868, from England	181	1710·5	38·17	[illegible]
16	1-14th Regiment, Cawnpore, (Detachment at Allahabad*)	1868	1868	December 1868, from England ...	830	1785·5	15·66	90·36
17	VIII Brig., G. Battery, R. Art., Cawnpore ...	1868	1868	April 1868, from England ...	138	2101·4	36·23	161·16
18	XVI Brig., D. Battery, R. Art., Allahabad ...	...	...	January 1869, from Barrackpore ...	143	1127·6	20·98	69·93
19	XXV Brig., 1 Battery, R. Art., Allahabad ...	...	...	January 1870, from Darjeeling ...	73	1205·5		41·10
	REGIMENTS OF BEHAR, BENARES, OUDE, AND CAWNPORE				7,229	1367·9	23·38	53·26

3.—REGIMENTS of

1	37th Regiment, Head Quarters, Shahjehanpore† ...	1867	1867	November 1868, from Bareilly ...	478	1165·1	12·55	62·76
2	37th Regiment, Left Wing, Moradabad (11 months)† ...	1867	1867	November 1868, from Bareilly ...	308	948·3	16·23	71·08
3	2-25th Regiment, Bareilly	1863	1868	November 1868, from Shahjehanpore and Berhampore	882	[illegible]	13·61	62·36
4	VIII Brig., D. Battery, R. Art., Bareilly	1866	1866	November 1867, from Seetapore ...	149	1060·4	[illegible]	[illegible]
5	103rd Regiment, Head Quarters, Roorkee	...	...	December 1869, from Morar	301	[illegible]	13·29	‡
6	Sappers and Miners, Roorkee, (20 Men at Chuckrata, from January to November)	...	...	... ...	41	[illegible]	24·39	
7	4th Hussars, Meerut	1868	1868	March 1868, from England	448	1296·2	22·32	66·96
8	105th Regiment, Meerut, (Detachment of 230 Men at Futtehghur throughout the year)	...	...	January 1869, from Dinapore ...	723	1105·1	23·52	40·11
9	A. Brig., C. Battery, R. H. Art., Meerut ...	1866	1866	January 1870, from Lucknow... ...	148	1804·9	13·51	60·81
10	F. Brig., D. Battery, R. H. Art., Meerut	...	...	March 1870, from Rawulpindee ...	136	2191·2		102·94
11	XVI Brig., F. Battery, R. Art., Meerut	...	...	February 1870, from Dinapore ...	142	1687·2	42·25	28·17
12	XIX Brig., D. Battery, R. Art., Meerut	...	...	March 1870, from Mooltan	141	2262·4	35·46	42·55
13	103rd Regiment, Wing, Delhi	...	...	December 1869, from Morar	252	1543·7	35·71	‡
14	XXIV Brig., 1 Battery, R. Art., Delhi	...	...	December 1869, from Mooltan ...	73	1876·7	13·70	164·38
15	11th Hussars, Muttra	1866	1866	January 1869, from Mhow	398	1133·2	5·03	10·20
	REGIMENTS OF ROHILCUND AND MEERUT				4,584	1293·6	17·89	58·03§

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* Of 125 men from January to August, and of 280 from September to December.
† The 37th Regiment furnished a working party of 170 men, which was employed on the Raneekhet roads from April to December. See Section 7 of this Table.
‡ Invalids went home with the Regiment.
§ Excluding Strength and Invaliding of Her Majesty's 103rd Regiment.

XIX.—(continued).

BENARES, OUDH, and CAWNPORE,—continued.

	Total Admissions and Loss of the Year by Deaths and Invaliding.		Causes of Admissions into Hospital, of Deaths in and out of Hospital, and of the Invaliding of 1870.																												
			Cholera.	Smallpox.	Intermittent Fevers.	Remittent and Continued Fevers.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Erysipelas.	Scurvy.	Anaemia and Debility.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Epilepsy and other Brain Affections.	Neuralgic Affections.	Delirium Tremens.	Ophthalmia.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Dysentery.	Diarrhoea.	Hepatitis.	Spleen Disease.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
15	Admissions	228	...	...	37	5	23	44	8	...	...	5	3	...	...	1	4	14	1	10	...	...	6	10	...	18	1	7	10	14	...	12
	Deaths	5											1						1			1		2								
	Invaliding	7					2					2								1							1					1
16	Admissions	1,482	1	...	107	266	23	327	31	...	3	33	19	2	1	6	3	32	14	46	7	38	45	107	2	63	3	15	79	87	...	62
	Deaths	18				3						1	1						2	1		1		8					1			
	Invaliding	75			6			2	1			7	9						11			5		26						3		5
17	Admissions	290	...	...	87	19	1	64	3	...	...	13	...	...	3	...	1	11	...	20	...	8	10	15	1	7	...	3	15	6	...	3
	Deaths	5													1							2		1						1		
	Invaliding	14							1			1			5						1			5					1			
18	Admissions	204	...	...	52	12	6	27	5	...	...	4	2	1	1	...	...	...	2	10	1	4	8	4	5	9	...	...	30	16	...	5
	Deaths	3												1							1			1								
	Invaliding	10			1		1		1			1	1		1										2				1			1
19	Admissions	88	...	...	7	6	2	17	2	...	...	1	...	...	...	...	...	4	...	4	...	6	1	1	...	1	...	...	19	6	...	11
	Deaths	None																													
	Invaliding	3					1		1																	1						
	Admissions	9,882	44	3	1330	1245	422	1833	232	4	14	160	58	24	44	35	47	270	73	303	43	352	481	534	20	416	16	125	769	591	...	325
	Deaths	169	1	1		30			2			1	10		2		1		10	1	1	16		16			2		1	12		5
	Invaliding	385			98	3	27	4	26		1	55	23	1	16	1		3	28	11	1	20	3	78	2	2	3	1	5	8		32

ROHILCUND and MEERUT.

	Total Admissions and Loss of the Year by Deaths and Invaliding.		Cholera.	Smallpox.	Intermittent Fevers.	Remittent and Continued Fevers.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Erysipelas.	Scurvy.	Anaemia and Debility.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Epilepsy and other Brain Affections.	Neuralgic Affections.	Delirium Tremens.	Ophthalmia.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Dysentery.	Diarrhoea.	Hepatitis.	Spleen Disease.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
1	Admissions	558	...	...	47	25	24	126	20	...	...	15	4	...	1	3	3	18	12	20	1	24	21	30	2	27	7	3	63	37	...	19
	Deaths	6													1				1			2								2		
	Invaliding	30			1		1		5			6	1						7			1		2		1	1		1	1		1
2	Admissions	289	...	1	37	53	6	69	5	1	...	5	1	...	...	1	...	1	2	10	1	2	12	27	1	6	...	...	13	16	...	19
	Deaths	5																						3						1		1
	Invaliding	23								1			3							1					7								8
3	Admissions	719	...	...	114	66	27	192	23	1	...	1	8	...	1	2	5	6	4	9	13	25	15	61	20	23	1	9	40	25	...	20
	Deaths	12				2													2			1		3	1					1		2
	Invaliding	55			9	1	1	1	6			1	1		1						1	3	1	16	1					2		1
4	Admissions	158	...	...	4	8	5	44	...	...	...	...	...	...	...	1	...	7	...	7	1	4	12	14	1	3	...	2	14	23	...	8
	Deaths	2																						1								1
	Invaliding	8								1			1							2					3						1		
5	Admissions	473	...	...	260	49	8	36	4	...	1	4	1	...	2	1	...	2	2	14	3	8	5	12	...	14	...	8	21	12	...	6
	Deaths	3											1		1							1										
	Invaliding	2																													
6	Admissions	31	...	...	9	1	2	3	...	...	...	1	...	...	...	...	...	...	1	...	...	...	1	...	...	6	...	...	3	1	...	3
	Deaths	1																	1													
	Invaliding	None																													
7	Admissions	578	1	1	57	99	24	52	7	...	...	10	8	1	...	3	1	23	2	17	1	15	25	42	5	17	2	14	56	45	...	20
	Deaths	10		1		1								1			1				1			4						2		
	Invaliding	30				4	3	2	2			3	1						1			2		5			1	1				2
8	Admissions	1,013	1	3	303	43	22	67	31	2	2	34	10	2	3	12	5	16	11	22	12	57	48	50	...	91	4	23	58	54	...	30
	Deaths	13				3							2	1					1		1	2		1						1		1
	Invaliding	26					1		1			1	2		1				2		3	3		4		1	2	1	1			1
9	Admissions	276	...	...	56	25	3	15	1	...	...	6	3	...	...	...	6	4	11	18	2	7	30	11	...	14	...	1	8	44	...	5
	Deaths	2				1																1										
	Invaliding	9											1						4	1			1	1								1
10	Admissions	298	...	...	89	6	13	28	8	1	...	14	2	...	...	4	2	8	1	14	3	4	20	9	4	9	...	1	11	37	...	10
	Deaths	None																													
	Invaliding	14			1		1		1			5	1						2					1	1					1		
11	Admissions	241	...	1	59	14	9	13	3	1	...	2	2	1	1	3	1	5	2	13	1	11	29	16	...	12	...	8	12	15	...	7
	Deaths	6		1		1							2				1							1								
	Invaliding	4					1					1												2								
12	Admissions	319	...	2	130	14	16	28	...	...	...	7	...	...	...	2	...	7	7	19	1	4	26	9	...	11	...	1	9	21	...	5
	Deaths	5		1																1	1	1		1								
	Invaliding	6					1					1							3				1									
13	Admissions	389	...	...	162	21	15	48	10	1	...	2	4	3	1	3	3	1	1	11	5	7	14	27	1	6	1	5	12	21	...	5
	Deaths	9				2								2					1		1	1		1			1					
	Invaliding	13											2											1								
14	Admissions	137	...	...	64	1	1	17	2	...	...	1	8	...	...	...	...	1	1	3	3	10	7	4	2	...	...	...	6	6	...	...
	Deaths	1											1																			
	Invaliding	12			3				1				1										1	1	1							1
15	Admissions	451	1	...	59	50	23	83	9	...	...	9	8	...	2	3	5	4	2	20	1	8	10	21	2	27	...	7	31	41	...	26
	Deaths	2											1											1								
	Invaliding	16			2							3	1						1					2				1		1		2
	Admissions	5,030	3	8	1,450	475	198	851	129	7	3	111	59	6	11	37	31	102	59	107	48	186	281	333	38	266	15	81	364	398	...	163
	Deaths	52		3		10							7	4	2		2		6	1	1	9		16	1		1			7		6
	Invaliding	230			16	5	9	3	10			31	23		2				26	1	4	8	4	45	5	2	1	3	2	6		23

4.—REGIMENTS of AGRA

	Regiments & Batteries, & Station of 1870.	Year of Arrival		Date of Arrival from Station previously occupied.	Average Strength during 1870.	Admission-rate of 1870 per 1,000 of Strength.	Loss per 1,000	
		In India.	In the Bengal Presidency.				By Deaths.	By Invaliding.
1	88th Regiment, Agra (10 months) ...	1857	1857	March 1870, from Nowshera ...	652	1374·2	13·80	... †
2	XIX Brig., F. Battery, R. Art., Agra ...	...	...	January 1870, from Meean Meer ...	140	2700·0	7·14	107·14
3	XXII Brig., 7 Battery, R. Art., Agra ...	...	...	April 1866, from Darjeeling ...	70	2014·3	...	85·71
4	1-11th Regiment, Morar (Detachment of 220 men at Gwalior Fortress) ...	1864	1864	November 1869, from Fyzabad ...	852	1785·2	24·65	55·16
5	F. Brig., B. Battery, R. H. Art., Morar ...	...	...	January 1870, from Sealkote ...	137	1846·7	51·09	43·80
6	XVI Brig., C. Battery, R. Art., Morar ...	...	...	March 1870, from Barrackpore ...	136	1294·1	36·76	44·12
7	XXV Brig., 3 Battery, R. Art., Morar ...	...	...	December 1868, from Fort William ...	74	2081·1	40·54	67·57
8	XXIV Brig., 2 Battery, R. Art., Gwalior Fortress ...	...	...	February 1869, from Meean Meer ...	74	1013·5	...	54·05
9	2-1st Regiment, Jhansi* ...	1866	1870	January 1870, from Nusseerabad ...	798	2125·3	18·80	52·63
10	XIX Brig., A. Battery, R. Art., Jhansi ...	...	...	January 1868, from Ferozepore ...	145	2062·1	13·79	55·17
11	1-19th Regiment, Saugor ...	1857	1857	January 1870, from Rawulpindee ...	822	2105·9	14·60	10·95
12	XVI Brig., E. Battery, R. Art., Saugor ...	...	...	January 1867, from Allahabad ...	140	1692·9	28·57	42·86
13	XXII Brig., 6 Battery, R. Art., Saugor ...	...	...	January 1869, from Meean Meer ...	67	1223·9	14·93	44·78
14	2-12th Regiment, Jubbulpore (Detachment of 190 men at Nowgong) ...	1864	1864	December 1867, from Seetapore ...	803	2115·8	34·87	16·19
15	XVI Brig., G. Battery, R. Art., Jubbulpore ...	...	...	January 1867, from Hazareebaugh ...	141	2120·6	28·37	99·29
	REGIMENTS OF AGRA AND CENTRAL INDIA ...			...	4,971	1906·8	22·53	62·51‡

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* A working party of 229 men was furnished by the 2-1st Regiment, and was employed from April to December on the Raneekhet roads. A detachment of 140 men was stationed at Seepree from April to the middle of November.

† Invalids went home with the regiment.

‡ Excluding the Strength of Her Majesty's 88th Regiment.

XIX,—(continued).

and CENTRAL INDIA.

	Total Admissions and Loss of the Year by Death and Invaliding.		Causes of Admissions into Hospital, of Deaths in and out of Hospital, and of the Invaliding of 1870.																													
			Cholera.	Smallpox.	Intermittent Fevers.	Remittent and Continued Fevers.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Erysipelas.	Scurvy.	Anæmia and Debility.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Epilepsy and other Brain Affections.	Neuralgic Affections.	Delirium Tremens.	Ophthalmia.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
1	Admissions	896	...	...	505	55	39	63	20	...	1	5	5	...	...	2	1	11	3	21	9	13	24	12	5	15	1	1	22	48	...	15
	Deaths	9				1							1									1		1								
	Invaliding	4																														
2	Admissions	378	...	...	160	33	18	39	7	...	...	13	5	...	...	4	...	5	2	9	4	7	8	15	...	12	...	3	10	16	...	8
	Deaths	1				1																										
	Invaliding	15			5	...	3					1	1						1			1		2		1						
3	Admissions	141	...	...	39	27	3	12	...	...	...	5	2	...	3	2	...	4	...	11	...	2	3	2	...	4	...	2	2	14	...	4
	Deaths	None																														
	Invaliding	6			1							1	1		1															1		
4	Admissions	1,521	...	...	675	171	47	150	3	4	...	16	5	4	2	3	5	34	11	41	2	48	34	31	6	44	10	11	65	57	...	42
	Deaths	21					...			1			2	3	1				1		1						1			6		
	Invaliding	17			1	5	5		2			5								1		5	1									
5	Admissions	253	...	...	60	25	5	24	9	...	...	4	1	...	6	2	1	1	4	4	6	8	13	14	...	12	...	2	18	28	...	6
	Deaths																					1		4						2		
	Invaliding	6							2			1							1					2								
6	Admissions	176	...	...	30	17	8	18	3	...	...	...	...	1	2	...	2	4	1	8	...	1	22	10	...	13	...	4	12	13	...	7
	Deaths					1																										
	Invaliding	6					1																									
7	Admissions	154	...	...	27	26	3	18	...	...	1	12	1	...	...	1	1	2	1	1	...	1	9	9	1	5	...	...	15	16	...	4
	Deaths																		1													
	Invaliding						...						1									1										
8	Admissions	75	...	...	19	8	2	11	1	...	...	1	3	1	4	...	1	...	...	2	...	...	1	3	...	6	...	...	5	6	...	1
	Deaths	None																														
	Invaliding	4											1	1																		
9	Admissions	1,696	1	...	881	36	64	165	37	1	1	41	4	4	11	8	2	30	5	58	11	21	79	23	6	55	1	11	57	48	...	45
	Deaths	16	1		1	2			1			1	2	2										1								
	Invaliding	42				1	3		1						1							1	3				1	1	1			
10	Admissions	357	...	...	191	4	8	51	20	...	...	10	...	...	...	...	2	1	...	6	...	4	10	5	1	9	...	1	12	17	...	5
	Deaths	2															1							1								
	Invaliding	8			3				2													1										
11	Admissions	1,731	...	...	694	387	40	133	17	3	...	23	13	1	1	2	...	10	9	84	4	15	34	38	5	43	2	8	87	58	...	20
	Deaths	12																									1			1		
	Invaliding	33			5		3		3					1	1				1	2				1								1
12	Admissions	237	...	...	140	4	11	24	4	1	...	1	1	...	...	...	2	...	1	9	...	...	5	2	1	12	...	3	4	7	...	5
	Deaths	4				1							1						1											1		
	Invaliding	6					1					1													1							
13	Admissions	82	...	...	37	...	7	8	...	...	...	...	...	...	...	...	...	1	...	...	...	...	2	11	...	1	...	2	11	2	...	...
	Deaths	1																												1		
	Invaliding	3																						3								
14	Admissions	1,940	1	...	1,199	34	49	126	17	3	...	15	18	4	7	6	2	10	10	46	6	34	88	61	15	35	4	12	57	48	...	33
	Deaths	28	1			6						3		3	2									5			1			3		
	Invaliding	40			20		1		1			16	2											14					2			
15	Admissions	299	...	...	102	3	3	57	8	...	...	1	...	...	2	2	1	6	...	4	...	12	20	12	3	9	...	...	23	20	...	11
	Deaths	1																						2								
	Invaliding	11							1									1						1						1		
	Admissions	9,936	2	...	4,759	830	307	899	146	12	3	147	58	15	38	32	20	109	47	301	42	166	352	248	43	275	18	60	400	398	...	206
	Deaths	112	2			15			1	1		1	9		1		1				1						3			11		
	Invaliding	277			4	6	19		17			44	12									11	1	31		1	1	1	3	2		15

TABLE

5.—REGIMENTS of

	REGIMENTS & BATTERIES, & STATION of 1870.	YEAR OF ARRIVAL		Date of Arrival from Station previously occupied.	Average Strength during 1870.	Admission-rate of 1870 per 1,000 of Strength.	LOSS PER 1,000	
		In India.	In the Bengal Presidency.				By Deaths	By Invaliding
1	20th Hussars, Umballa ...	...	...	March 1870, from Campbellpore ...	428	1341·1	16·36	60·75
2	106th Regiment, Umballa ...	...	...	April 1868, from Meean Meer ...	878	1566·1	14·81	35·31
3	C. Brig., F. Battery, R. H. Art., Umballa ...	...	...	February 1870, from Benares ...	139	1352·5	21·58	71·94
4	F. Brig., E Battery, R. H. Art., Umballa ...	...	...	April 1868, from Peshawur ...	137	1328·5	14·60	65·69
5	92nd Regiment, Jullundur* (Detachment of 63 men at Umritsur for the year, and of 109 men at Dhurmsalla from April to October.)	1868	1868	March 1868, from England ...	844	2184·8	13·03	54·50
6	XIX Brig., G. Battery, R. Art., Jullundur ...	...	...	January 1866, from Peshawur ...	142	1274·6	21·13	77·46
7	39th Regiment, Ferozepore ...	1869	1869	November 1869, from England ...	831	1351·4	31·29	9·63
8	XXII Brig., B. Battery, R. Art., Ferozepore ...	...	...	January 1868, from Jhansi ...	147	2170·0	13·61	74·83
9	XXII Brig., 5 Battery, R. Art., Ferozepore ...	...	...	January 1870, from Meean Meer ...	73	2260·2	13·70	82·19
10	100th Regiment, Mooltan* (Detachment of 98 men at Dera Ismael Khan.)	...	1867	December 1867, from Bombay Presidency	819	1890·2	26·86	62·27
11	XIX Brig., C. Battery, R. Art., Mooltan ...	...	...	January 1870, from Meerut ...	143	1468·5	13·99	34·96
12	XXV Brig., 2 Battery, R. Art., Mooltan ...	...	...	December 1869, from Delhi ...	71	1986·0	14·09	14·09
13	5th Lancers, Sealkote ...	1864	1864	February 1870, from Lucknow ...	402	969·7	23·81	62·77
14	58th Regiment, Sealkote* ...	1865	1865	February 1870, from Allahabad ...	621	1917·9	20·93	46·70
15	A. Brig., E. Battery, R. H. Art., Sealkote ...	1865	1865	February 1870, from Peshawur ...	136	2250·0	14·71	80·88
16	XXII Brig., 4 Battery, R. Art., Umritsur ...	...	...	January 1870, from Peshawur ...	66	2636·4	15·15	45·45
17	85th Regiment, Meean Meer,* (Detachment of 65 men at Fort Lahore).	1868	1868	April 1868, from England ...	866	2986·0	20·50	30·25
18	F. Brig., F. Battery, R. H. Art., Meean Meer ...	...	...	March 1868, from Peshawur ...	140	1761·3	7·14	78·57
19	VIII Brig., H. Battery, R. Art., Meean Meer ...	1868	1868	January 1870, from Agra ...	145	1634·5	20·69	68·97
20	XXIV Brig., 5 Battery, R. Art., Meean Meer ...	...	...	April 1869, from Morar ...	71	1591·6	14·08	42·25
21	106th Regiment, Rawulpindee† ...	1868	1868	March 1868, from England ...	847	1691·9	21·25	34·24
22	36th Regiment, Rawulpindee† ...	1864	1864	November 1869, from Peshawur ...	712	2285·1	23·88	113·76
23	A. Brig., B. Battery, R. H. Art., Rawulpindee ...	1866	1866	February 1870, from Peshawur ...	130	2076·9	23·08	38·46
24	XIX Brig., E Battery, R. Art., Rawulpindee ...	...	...	April 1868, from Peshawur ...	141	2957·4	14·18	42·55

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* These regiments furnished working parties, which were employed in the Chumba Hills from April to the first week of November. The strengths were as follows:— 92nd, 151; 100th, 100; 58th, 150; and 85th, 124 men.

† These regiments and the 104th, stationed at Nowshera, sent working parties to the Murree Hills from May to October. The maximum strengths were—[illegible]th, 204; 36th, 209; and 104th, 100.

the PUNJAB.

No.	Total Admissions and Loss of the Year by Deaths and Invaliding.		Causes of Admissions into Hospital, of Deaths in and out of Hospital, and of the Invaliding of 1870.																													
			Cholera.	Smallpox.	Intermittent Fevers.	Remittent and Continued Fevers.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Erysipelas.	Scurvy.	Anæmia and Debility.	Phthisis Pulmonalis.	Apoplexy & Sunstroke.	Epilepsy and other Brain Affections.	Neuralgic Affections.	Delirium Tremens.	Ophthalmia.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy & Pneumonia.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
1	Admissions	574	1	2	119	125	33	34	8	1	...	10	4	1	6	2	4	4	5	43	1	5	27	6	...	25	...	12	23	54	...	10
	Deaths	7	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	1	1	...	...	...	1	...	...	...	...	...	1	...	1
	Invaliding	29	...	...	6	...	7	...	3	...	...	8	...	...	...	...	...	...	1	1	...	...	...	...	...	...	1	...	...	1	...	1
2	Admissions	1,375	...	...	520	100	78	142	30	...	1	8	11	1	2	12	1	32	4	63	5	24	40	24	8	32	1	11	97	91	...	31
	Deaths	13	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	1	...	1	...	...	2	...	...	...	...	...	3	...	1
	Invaliding	31	...	...	3	...	3	...	6	...	...	5	5	1	1	...	...	...	2	...	...	...	...	3	...	...	...	...	...	...	...	2
3	Admissions	188	...	1	29	27	6	15	7	...	...	5	1	...	...	4	1	2	1	8	...	5	5	22	...	7	...	...	8	20	...	14
	Deaths	3	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1
	Invaliding	10	...	...	1	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	1	...	3	...	...	...	...	...	1	...	1
4	Admissions	182	...	...	38	8	10	18	...	...	...	3	2	1	...	2	...	4	1	9	...	2	2	16	...	13	...	...	16	25	...	12
	Deaths	2	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
	Invaliding	9	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	1	...	...	1	1	2	...	...	...	...	...	...	...	2
5	Admissions	1,844	...	...	900	90	103	122	13	2	...	74	10	4	2	20	7	13	2	67	8	12	64	57	7	56	...	10	81	66	...	48
	Deaths	11	...	...	...	2	...	...	...	...	...	...	...	2	...	...	...	...	...	...	2	1	...	1	...	...	...	...	...	1	...	2
	Invaliding	46	...	...	1	...	5	...	1	...	...	27	4	...	...	...	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...	2
6	Admissions	181	...	...	22	32	6	26	2	...	...	11	...	...	1	3	1	4	1	7	1	3	5	7	...	5	2	4	9	19	...	10
	Deaths	3	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	Invaliding	11	...	...	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	4
7	Admissions	1,123	...	...	54	448	11	128	22	4	...	1	16	5	...	...	12	28	8	52	2	26	47	8	...	82	4	7	64	65	...	29
	Deaths	26	...	...	...	3	...	...	...	...	...	...	...	8	...	...	...	...	3	...	1	2	...	3	...	...	1	...	2	2	...	1
	Invaliding	8	...	...	...	...	...	...	1	...	...	1	5	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
8	Admissions	319	...	...	70	21	13	45	5	...	...	2	...	2	9	...	1	6	4	41	1	1	10	7	3	26	...	2	15	26	...	9
	Deaths	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...
	Invaliding	11	...	...	1	...	...	...	1	...	...	3	...	...	2	...	...	...	...	...	...	...	...	2	...	1	...	...	...	...	...	1
9	Admissions	165	...	...	68	22	8	5	...	...	...	...	1	...	...	...	7	...	1	6	1	...	2	5	1	8	...	...	13	12	...	5
	Deaths	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
	Invaliding	6	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	3	...	...	...
10	Admissions	1,553	...	...	727	120	53	106	10	5	1	31	15	1	19	[illegible]	1	17	9	55	12	51	42	28	2	65	7	3	87	49	...	33
	Deaths	22	...	...	...	6	...	...	...	...	...	...	...	3	...	...	...	...	1	1	3	2	...	3	...	...	1	...	...	2	...	...
	Invaliding	51	...	...	...	...	6	...	1	...	...	22	1	...	[illegible]	...	...	...	1	5	...	1	...	1	...	...	...	...	...	2	...	4
11	Admissions	210	...	...	64	27	5	8	...	1	3	4	...	...	4	1	4	7	...	14	2	2	2	22	...	8	...	2	6	18	...	6
	Deaths	2	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Invaliding	5	...	...	2	...	...	...	...	...	1	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	Admissions	141	...	...	64	8	2	11	1	...	...	4	...	...	...	5	1	1	1	5	...	4	5	8	1	2	1	...	8	8	...	1
	Deaths	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
	Invaliding	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
13	Admissions	448	...	...	25	157	15	38	4	...	2	18	6	1	1	1	3	13	5	11	3	12	7	8	1	20	2	12	30	29	...	21
	Deaths	11	...	...	...	3	...	...	...	...	...	...	3	1	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	1	...	1
	Invaliding	29	...	...	...	1	1	...	...	...	...	11	3	...	...	1	...	...	3	...	...	...	1	2	...	...	...	...	...	...	...	3
14	Admissions	1,191	...	2	472	40	36	172	18	1	...	13	2	3	7	5	1	32	...	38	3	20	68	40	2	36	5	22	64	49	...	31
	Deaths	13	...	...	...	2	...	...	...	...	...	...	2	...	1	...	1	...	...	...	...	2	...	3	...	...	2	...	...	...	...	...
	Invaliding	29	...	...	1	...	1	...	2	...	...	5	1	...	1	...	...	1	...	...	...	2	...	7	...	...	1	...	2	...	...	2
15	Admissions	306	...	...	88	113	3	11	5	...	...	3	...	3	...	2	...	...	...	1	1	3	15	10	3	4	...	2	10	23	...	6
	Deaths	2	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Invaliding	11	...	...	...	...	...	...	...	...	...	8	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	1
16	Admissions	174	...	...	42	48	...	18	...	...	...	4	...	1	1	...	2	1	4	3	...	2	7	3	...	15	...	...	6	9	...	8
	Deaths	3	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
	Invaliding	3	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
17	Admissions	2,595	...	...	1,540	110	84	225	24	4	...	16	11	3	6	6	5	11	10	68	16	52	101	26	10	43	1	14	103	66	...	42
	Deaths	23	...	...	...	9	...	...	1	...	...	...	3	2	...	...	...	...	1	...	1	2	...	2	...	...	...	...	...	1	...	1
	Invaliding	34	...	...	1	...	1	...	1	...	...	2	3	...	1	...	...	...	2	1	2	...	...	5	1	2	1	...	...	...	...	8
18	Admissions	247	...	...	108	15	9	7	2	...	...	1	...	...	...	...	...	3	1	14	...	1	24	18	...	5	...	5	21	15	...	8
	Deaths	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
	Invaliding	11	...	...	2	...	1	...	1	...	...	2	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	1	2	...	...
19	Admissions	237	...	...	89	11	17	14	2	...	...	1	2	...	...	1	...	3	...	10	2	2	20	1	2	6	1	2	17	22	...	12
	Deaths	3	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
	Invaliding	10	...	...	2	...	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...
20	Admissions	113	...	...	52	6	2	6	...	...	...	...	1	1	...	...	...	1	...	4	4	2	11	5	...	2	...	1	4	8	...	3
	Deaths	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
	Invaliding	3	...	...	...	...	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	Admissions	1,433	...	...	722	201	33	118	4	...	...	7	4	1	...	...	2	25	5	54	2	16	48	27	1	18	1	12	43	50	...	39
	Deaths	18	...	...	1	9	...	...	...	...	...	1	2	...	...	...	...	...	...	...	1	...	...	1	...	...	1	...	...	...	...	2
	Invaliding	29	...	...	...	...	...	...	...	...	...	6	1	...	...	...	5	4	...	2	...	2	...	7	1	...	...	...	...	...	...	1
22	Admissions	1,627	...	...	705	378	41	56	30	1	...	12	11	2	6	1	3	11	2	71	12	7	56	15	17	35	3	9	30	81	...	23
	Deaths	17	...	...	...	3	...	...	1	...	...	...	1	1	...	...	1	...	1	...	2	2	...	...	...	...	...	...	1	...	...	1
	Invaliding	81	...	...	14	1	3	2	[illegible]	...	...	21	[illegible]	...	1	...	...	...	1	1	...	1	...	1	3	...	...	...	...	1	...	3
23	Admissions	387	...	...	221	30	10	10	2	...	1	3	...	...	3	1	...	3	1	24	4	3	5	10	3	10	1	...	9	16	...	17
	Deaths	3	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Invaliding	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	3
24	Admissions	417	...	...	240	4	11	12	5	1	...	7	...	...	4	2	1	1	1	17	1	5	23	22	6	15	4	5	5	17	...	8
	Deaths	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...
	Invaliding	6	...	...	...	...	...	...	...	...	...	3	...	...	1	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...

REGIMENTS of

	REGIMENTS & BATTERIES, & STATION OF 1870.	YEAR OF ARRIVAL		Date of Arrival from Station previously occupied.	Average Strength during 1870.	Admissions of 1870 per 1,000 of Strength.	LOSS PER 1,000	
		In India.	In the Bengal Presidency.				By Deaths.	By Invaliding.
25	XIX Brigade, B. Battery, R. Art., Campbellpore, (at Peshawur from January to April)	...	...	May 1870, from Peshawur	147	2095·2	27·21	54·42
26	XXIV Brigade, 6 Battery, R. Art, Attock ...	...	...	November 1869, from Govindghur ...	66	2272·7	15·15	30·30
27	104th Regiment, Nowshera *† (Detachment of 95 men at Attock)	...	...	January 1870, from Peshawur ...	697	2331·4	25·82	15·78
28	1-5th Regiment, Peshawur†	1867	1867	January 1870, from Ferozepore ...	896	3914·1	40·18	13·39
29	38th Regiment, Peshawur†	1857	1857	November 1869, from Sealkote ...	820	3706·1	29·27	57·32
30	A. Brigade, A. Battery, R. H. Art., Peshawur† ...	1866	1866	January 1870, from Meerut	130	3884·6	23·08	100·00
31	A. Brigade, D. Battery, R. H. Art., Peshawur† ...	1865	1865	February 1870, from Meerut	129	3930·2	54·26	69·77
32	XXV Brigade, 4 Battery, R. Art., Peshawur† ...	...	...	November 1869, from Attock... ...	75	3153·3	40·00	80·00
	REGIMENTS OF THE PUNJAB				11,949	2253·7	23·94	52·17

6.—*REGIMENTS cantoned during*

1	XXIV Brigade, 4 Battery, R. Art., Darjeeling ...	...	...	December 1869, from Allahabad ...	65	1861·5	15·38	76·92
2	55th Regiment, Chuckrata	1864	1864	May 1869, from Lucknow	883	918·5	18·12	22·65
3	1-3rd Regiment, Dugshaie	1867	1867	April 1869, from Meerut	874	568·6	5·72	29·75
4	41st Regiment, Subathoo	1865	1865	February 1869, from Agra ...	863	757·8	10·43	37·08
5	XXII Brigade, A. Battery, R. Art., Jutogh	...	...	March 1869, from Allahabad	79	557·0	12·66	...
6	XXV Brigade, 5 Battery, R. Art., Huzara‡ ...	...	...	April 1869, from Abyssinia and Bombay Presidency	86	569·8	11·63	.
	HILL STATIONS OF THE BENGAL PRESIDENCY				2,850	763·5	11·58	29·12

7.—*DEPOT, INVALID GARRISON,*

1	Chinsurah Depôt	70	.	...	...
2	Invalid Garrison, Chunar	26		...	...
3	Road-making Parties in the Hills (season 1870, April to October)	904§	1576·3	7·74	...
4	Deaths of Bengal Regiments in other Presidencies, &c., (not included in any of the preceding Tables)	...	...		

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* See note on previous page.

† During October and November, a strength of 723 men, drawn from Peshawur and Nowshera, occupied the Cherat Hill.

‡ At Rawulpindee, from January to April, and in November and December.

§ As for 12 months. The maximum strength employed during the season was 1,575.

XIX,—(continued).

the PUNJAB,– continued.

CAUSES OF ADMISSIONS INTO HOSPITAL, OF DEATHS IN AND OUT OF HOSPITAL, AND OF THE INVALIDING OF 1870.

	Total Admissions and Loss of the Year by Deaths and Invaliding.	Cholera.	Smallpox.	Intermittent Fevers.	Remittent and Continued Fevers.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Erysipelas.	Scurvy.	Anaemia and Debility.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Epilepsy and other Brain Affections.	Neuralgic Affections.	Delirium Tremens.	Ophthalmia.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Dysentery.	Diarrhœa.	Hepatitis.*	Spleen Disease.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
25	Admissions 308	...	...	141	6	12	11	4	...	...	2	6	...	...	1	3	14	4	6	6	4	10	11	2	10	...	5	15	22	...	13
	Deaths 4				1													1													
	Invaliding 8										1	3					1						1								2
26	Admissions 150	...	...	90	3	5	9	...	...	...	2	...	...	1	...	...	1	...	7	...	4	...	4	2	3	...	...	8	5	...	6
	Deaths 1																														1
	Invaliding 2										1							1													
27	Admissions 1,625	...	1	1078	163	36	34	3	...	...	14	1	4	1	8	1	3	1	38	2	12	39	12	7	26	3	5	39	37	...	62
	Deaths 18				5								2						1	1	1		1						2		3
	Invaliding 31			5		1		3			10							2			1	2		2	1						1
28	Admissions 3,507	...	2	2286	603	52	113	12	6	...	13	2	4	2	6	7	13	2	88	10	27	77	19	4	30	2	9	49	61	...	100
	Deaths 30				16							2	1			1		2		5								1	2		
	Invaliding 30					4	2	1			3			1									3		1				1		18
29	Admissions 3,039	...	1	1450	721	52	70	7	...	1	26	10	6	1	7	5	23	2	239	9	47	66	60	1	44	1	15	59	68	..	42
	Deaths 21		1		1							1	3	1						6	1		5								
	Invaliding 17					3		1			22	3						2	1				8								5
30	Admissions 505	...	...	267	116	12	10	4	1	...	5	2	...	...	4	...	1	2	17	2	3	8	1	3	20	...	4	7	9	...	7
	Deaths 3				1								1						1												
	Invaliding 15					2		1			3	2						4					1		2						
31	Admissions 507	...	...	211	174	7	4	*5	...	...	5	2	...	...	...	...	...	2	20	3	8	16	6	2	14	...	3	5	15	...	5
	Deaths 7				1						1	1								1	1		2								
	Invaliding 9										2	1						1					1	1	1				1		1
32	Admissions 259	...	...	110	52	6	8	2	...	...	2	5	1	...	1	...	1	...	16	1	2	3	14	1	7	...	1	11	5	..	10
	Deaths 3											1	1										1								
	Invaliding 6					1						1	1					1					2								
	Admissions 26,930	1	9	12024	3879	771	1606	231	27	9	315	125	44	76	63	73	278*	79	1116	114	307	855	526	89	604	39	183	971	1060	..	678
	Deaths 286			1	71			2			2	21	35	1		3		17	9	28	22		28	1		7		1	18		18
	Invaliding 657			47	2	17	4	31		1	189	14	2	15	1		6	26	14	2	12	5	72	9		1		7	9		77

the year at HILL STATIONS.

	Total Admissions and Loss of the Year by Deaths and Invaliding.	Cholera.	Smallpox.	Intermittent Fevers.	Remittent and Continued Fevers.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Erysipelas.	Scurvy.	Anaemia and Debility.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Epilepsy and other Brain Affections.	Neuralgic Affections.	Delirium Tremens.	Ophthalmia.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Dysentery.	Diarrhœa.	Hepatitis.*	Spleen Disease.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
	Admissions 121	...	...	40	7	6	7	2	...	...	...	...	...	3	2	...	1	...	10	...	3	2	9	...	5	.	5	1	11		7
	Deaths 1																						1								
	Invaliding 5					1															1		2								1
2	Admissions 811	1	...	44	78	61	81	33	4	...	1	12	1	1	11	5	22	22	122	9	12	25	18	...	40	3	15	30	110	...	41
	Deaths 16							1										6			2								1		
	Invaliding 29					1		1			2	4			1			5			1		2						1		
3	Admissions 497	...	...	57	51	54	74	4	...	...	...	...	...	...	1	2	19	1	62	11	1	17	27	...	21	1	5	28	48	.	13
	Deaths 5																	1		3			1								
	Invaliding 26			1		7					5						1		3				6					1			
4	Admissions 654	...	...	171	50	23	53	...	...	...	15	15	...	2	5	5	12	3	40	15	16	36	43	1	25	1	8	37	51	..	21
	Deaths 9				2									1				1					4						2		
	Invaliding 32					1					14	7						1	3		2		3						1		
5	Admissions 44	...	...	13	...	1	6	1	...	...	...	...	...	1	...	...	...	1	2	...	...	3	3	...	1	...	...	2	9	...	1
	Deaths 1							1																							
	Invaliding ..																														
6	Admissions 49	...	...	6	2	3	8	...	1	...	...	...	...	...	...	1	...	...	3	...	...	1	3	...	3	1	5	2	9		1
	Deaths 1																														
	Invaliding																														
	Admissions 2,176	1	...	331	188	148	229	40	5	...	16	27	1	7	19	13	54	27	245	33	32	84	103	1	104	6	38	100	238	..	84
	Deaths 33				1			2	1					1									1						6		
	Invaliding 84			1		10		1			21	11			1		1	6	6		1		17					1	2		

ROAD-MAKING PARTIES, &c.

	Total Admissions and Loss of the Year by Deaths and Invaliding.	Cholera.	Smallpox.	Intermittent Fevers.	Remittent and Continued Fevers.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Erysipelas.	Scurvy.	Anaemia and Debility.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Epilepsy and other Brain Affections.	Neuralgic Affections.	Delirium Tremens.	Ophthalmia.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Dysentery.	Diarrhœa.	Hepatitis.*	Spleen Disease.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
1	Admissions 129	...	...	5	6	12	27	3	...	...	1	2	...	1	3	1	2	1	5	...	8	11	1	...	11	1	3	13	4	.	8
	Deaths None																														
2	Admissions 81	...	...	7	1	...	1	...	...	...	1	...	1	2	1	8	...	...	1	...	...	4	.	...	2	.	...	1	..	..	1
	Deaths 2												1			1															
3	Admissions 1,425	...	...	677	30	64	158	...	1	...	...	1	...	...	...	8	10	...	54	...	15	96	39	4	...	...	...	61	88	...	104
	Deaths 7				1				1							1					1								2		1
	Deaths 29				1						1	7								1			3								

* Of these 14 were cases of Palpitation.

TABLE 8.—*CONVALESCENT*

	CONVALESCENT DEPÔTS.	Period of Occupation.	Average Strength during the period of occupation.	Admission-rate of 1870 per 1,000 of Strength.	Loss per 1,000	
					By Deaths.	By Invaliding.
1	Darjeeling	Eight months, April to November	127	1748·0	55·12	251·97
2	Nynee Tal	Nine months, April to December	381	2023·6	18·37	286·00
3	Landour	Eight months, April to November	208	1754·8	14·42	206·73
4	Kussowlie	Eight months, from middle of April to middle of December	511	1242·7	21·53	252·45
5	Dalhousie	Seven months, April to October	200	1395·0	15·00	110·00
6	Murree	Six months, May to October	481	801·6	27·03	161·21*
	CONVALESCENT DEPÔTS OF THE BENGAL PRESIDENCY		1,945	1367·1	22·62	212·85
	EUROPEAN ARMY OF THE BENGAL PRESIDENCY		33,889‡	1,702·2‡	21·31‡	52·50†

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* The men from Murree were invalided after returning to their regiments.

† Calculated after excluding the strength of the 88th and 103rd Regiments, which took home their invalids.

‡ As in the corresponding table of last year, the aggregate of the regimental strengths as given exceeds the actual strength by upwards of 300; this excess probably represents men in the depôts of other Presidencies and elsewhere. For the Army of the Presidency, the ratios shown in Table I are to be accepted as the proper ratios of the year.

ANNUAL RELIEF OF

ROYAL ARTILLERY.

A. Brigade	Head Quarters	From	Meerut	To Peshawur ...	... Arrived	December	1870.
C. Brigade	F. Battery	„	Umballa	„ England ...	... Marched	February	1871.
8th Brigade	D. Battery	„	Bareilly	„ Jubbulpore ...	.. Arrived	March	1871.
	E. Battery	„	Fyzabad	„ Saugor ...	... Arrived	December	1870.
	F. Battery	„	Seetapore	„ Barrackpore ...	. Arrived	February	1871.
	G. Battery	„	Cawnpore	„ Jullundur ...	.. Arrived	December	1870.
16th Brigade	A. Battery	„	Barrackpore	„ Seetapore ...	... Arrived	February	1871.
	E. Battery	„	Saugor	„ Fyzabad ...	. Arrived	February	1871.
	G. Battery	„	Jubbulpore	„ Bareilly ...	. Arrived	December	1870.
19th Brigade	Head Quarters	„	Peshawur	„ Meerut ..	Arrived	January	1871.
	A. Battery	„	Jhansi	„ Cawnpore ...	.. Arrived	January	1871.
	B. Battery	„	Campbellpore	„ Ferozepore ...	.. Arrived	January	1871.
	G. Battery	„	Jullundur	„ Nowgong ...	... Arrived	January	1871.
22nd Brigade	Head Quarters	„	Morar	„ Meean Meer ..	... Arrived	November	1870.
	B. Battery	„	Ferozepore	„ Peshawur ...	... Arrived	December	1870.
24th Brigade	Head Quarters	„	Meean Meer	„ Morar ...	... Arrived	November	1870.

INFANTRY REGIMENTS.

2-1st Regiment	From	Jhansi	To Shahjehanpore and Moradabad ...	.. Arrived	January	1871.
1-3rd Regiment	„	Dugshaie	„ Seetapore and Benares	... Arrived	November	1870.
1-5th Regiment	„	Peshawur	„ Nowshera ..	... Arrived	December	1870.

DEPOTS.

Causes of Admissions into Hospital, of Deaths in and out of Hospital, and of the Invaliding of 1870.

	Total Admissions and Loss of the Year by Deaths and Invaliding.		Cholera.	Smallpox.	Intermittent Fevers.	Remittent and Continued Fevers.	Rheumatism and Rheumatic Affections.	Primary Venereal Affections.	Secondary Venereal Affections.	Erysipelas.	Scurvy.	Anaemia and Debility.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Epilepsy and other Brain Affections.	Neuralgic Affections.	Delirium Tremens.	Ophthalmia.	Heart Disease and Aneurism.	Tonsillitis, Bronchitis, and Asthma.	Pleurisy and Pneumonia.	Dysentery.	Diarrhoea.	Hepatitis.	Spleen Disease.	Functional derangements of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Abscess and Ulcer.	Injuries and Accidents.	Punished.	All other Causes.
1	Admissions	222	...	...	24	4	22	13	6	...	...	4	...	1	14	5	1	5	...	30	1	16	9	41	...	6	...	3	6	4	...	7
	Deaths ..	7	...	...	...	...	...	...	...	...	...	...	...	...		...	...	...		...	...	1		6	...	...	...	...	...	...	...	...
	Invaliding...	32	...	...	3	...	5	...	2	...	...	3	2	...	3	...	...		...	7	...	1	...	5	...	...	...	...	1	...	...	...
2	Admissions	771	...	...	219	83	43	52	15	3	...	36	3	...	2	...	...	2	17	27	1	12	37	68	22	40	4	3	40	27	...	15
	Deaths ...	7	...	...	...	...	...	...	...	...	...	1	...	...		...	...	...	1	...	...	2	...	3	...	...	...	...	...	...	...	
	Invaliding...	109	...	...	35	...	1	1	5	...	...	33	...		3			...	9	1	...	2	2	15	1	...	...	...	...	...		1
3	Admissions	365	...	...	151	6	8	12	20	...	2	8	14	...	...	3	...	1	4	7	8	7	27	40	10	10	...	2	6	13	...	6
	Deaths ...	3	...	...	...	...	...	...	...	...	...	...	...	...	...		...	...	...	1	1		...	1		...	...	...	...	...	...	...
	Invaliding...	43			7	...	1	...	5	...	...	3	5	...				...	...	...	1	1	...	10	2	1	...	1	1	1		1
4	Admissions	685	...	...	182	8	66	33	29	3	...	61	9	1	4	...	...	12	1	22	7	27	53	29	3	25	2	8	24	12	...	19
	Deaths ...	11	...	...	...	...	...	...	1	...	...	1	2	1	1	...	...	...	...	...	2	1	...	2	...	...		...	...	...	...	...
	Invaliding...	12[illegible]		...	26	...	5	...	11	...	...	29	6	2	3	...			1	1	...	4	1	10		2	1	...	5	4	...	6
5	Admissions	279	...	...	119	10	13	11	13	2	...	10	3	...	3	...	...	1	...	18	...	5	24	10	4	4	2	1	13	6	...	7
	Deaths ...	3	...	...	...	1		...	...	...	...			...	...		...	...				...					1	...	...	1		...
	Invaliding	22	...		9	...	...	...	3	...	...	11	1	...	...	...	...	...	...	...	...	...	...	3	1	...		...	...	...		...
6	Admissions	387	...	...	146	7	26	24	6	...	...	12	2	...	4	...	...	2	4	25	5	10	30	22	13	8	...	2	20	5	...	14
	Deaths ..	13	...	...	...	2	...	...	...	...	...	...	1	...	...		...	...	...	...	2	3		2			...		...	...		3
	Invaliding..	79			16	1	4	1	1	...	...	21	3	1	3			...	2	1	...	1		6	9	...	...	...	...	...	...	3
	Admissions	2,659	...	...	841	113	178	145	89	8	2	131	31	2	27	8	1	23	26	129	22	77	180	210	52	93	8	19	100	67	...	68
	Deaths ..	41	...	...	...	3	...	...	1	...	...	2	3	1	1	...		...	1	1	5	7	...	14		...	1		...	1		3
	Invaliding ..	414	...	...	96	1	16	2	30	...	...	103	17	3	12	...	...	...	12	10	1	12	...	58	13	3	1	1	7	5		11
	Admissions ...	57,344†	54	21	20,736	700	1930	5817	820	67	30	798	337	95	185	233	191*	858	296	2303	288	1261	2147	1695	205	1,929	104	535	2767	2850	...	1587
	Deaths ...	718	21	5	[illegible]	138	...	...	[illegible]	2	...	[illegible]	48	51	15	...	[illegible]	...	49	[illegible]	44	69	...	111	3	...	14	...	6	63		41
	Invaliding ...	1,080	...	...	[illegible]	16	115	[illegible]	98	...	2	355	120	8	39	5	...	13	111	[illegible]	8	69	10	262	20	13	12	5	20	22		15[illegible]

* Admissions on account of drunkenness no longer appear in the Medical Returns under the heading Ebriositas; excluding the 88th and 103rd Regiments and the 3rd Battalion Rifle Brigade which left the Presidency without furnishing Returns, 12,[illegible] cases of drunkenness occurred in the Bengal Army during 1870.

† See note prefixed to this table.

THE ARMY,* 1870-71.

INFANTRY REGIMENTS,—*continued.*

1-6th Regiment	From	Rawulpindee	To	Peshawur	... Arrived	April	1871.
2-12th Regiment	„	Jubbulpore	„	Subathoo	... Arrived	February	1871.
1-19th Detachments	„	Saugor	„	Jubbulpore and Puchmurree	Arrived	February	1871.
37th Regiment	„	Shahjehanpore and Moradabad	„	Meean Meer	... Arrived	December	1870.
38th Regiment	„	Peshawur	„	Rawul Pindee	... Arrived	April	1871.
41st Regiment	„	Subathoo	„	Mooltan	... Arrived	November	1870.
2-60th Regiment	„	Seetapore and Benares	„	Peshawur	... Arrived	December	1870.
63rd Regiment	„	England	„	Hazareebaugh	... Arrived	December	1870.
66th Regiment	„	England	„	Agra	... Arrived	February	1871.
72nd Regiment	„	England	„	Umballa	... Arrived	April	1871.
85th Regiment	„	Meean Meer	„	Dugshaie	... Arrived	October	1870.
88th Regiment	„	Agra	„	England	... Marched	November	1870.
96th Regiment	„	Dum-Dum and Barrackpore	„	Dinapore and Chunar	... Arrived	November	1870
103rd Regiment	„	Roorkee and Delhi	„	England	... Marched	December	1870.
104th Regiment	„	Nowshera	„	Allahabad	... Arrived	February	1871.
106th Regiment	„	Umballa	„	Jhansi, Nowgong, and Fort Gwalior ...	Arrived	November	1870.
107th Regiment	„	Hazareebaugh	„	Dum-Dum and Barrackpore	Arrived	November	1870.
108th Regiment	„	Mooltan	„	Roorkee and Delhi	... Arrived	December	1870.
3rd Battalion Rifle Brigade	„	Dinapore	„	Aden	... Marched	November	1870.

EUROPEAN TROOPS, 1870.

XX.

TABLE showing the NUMBER of DAYS spent in HOSPITAL by the MEN of each REGIMENT.

STATION.	Regiment.*	Average Strength for the Year.*	Aggregate of the Number of Days spent in Hospital.	Average Number of Days per Man.
FORT WILLIAM ...	2-19th Regiment ...	882	21,688	24·6
	XXII Brigade, 3 Battery, Royal Artillery ...	66	926	14·0
DUM-DUM AND BARRACKPORE ...	98th Regiment ...	872	17,899	20·5
BARRACKPORE ...	XVI Brigade, A Battery, Royal Artillery ...	144	2,320	16·1
	XVI Brigade, B Battery, Royal Artillery ...	153	3,404	22·2
HAZAREEBAUGH ...	107th Regiment ...	885	9,281	10·5
DINAPORE ...	3rd Battalion, Rifle Brigade†	801	11,239	14·0
	VIII Brigade, B Battery, Royal Artillery ...	148	3,705	25·0
BENARES ...	2-60th Regiment, Wing ...	372	7,131	19·2
	F Brigade, A Battery, Royal Horse Artillery ...	136	3,038	22·3
FYZABAD ...	26th Regiment ...	823	14,340	17·4
	VIII Brigade, E Battery, Royal Artillery ...	143	2,642	18·5
LUCKNOW ...	21st Hussars ...	440	9,682	22·0
	1-17th Regiment ...	784	17,168	21·9
	62nd Regiment ...	820	18,735	22·9
	F Brigade, C Battery, Royal Horse Artillery ..	139	4,746	34·1
	VIII Brigade, C Battery, Royal Artillery ...	145	4,613	31·8
	XXIV Brigade, 3 Battery, Royal Artillery ..	60	732	12·2
SEETAPORE ...	2-60th Regiment, Head Quarters ...	405	6,542	16·1
	VIII Brigade, F Battery, Royal Artillery ...	131	2,116	16·1
CAWNPORE ...	1-14th Regiment ...	830	31,161	37·5
	VIII Brigade, G Battery, Royal Artillery ...	138	4,741	34·4
ALLAHABAD ...	XVI Brigade, D Battery, Royal Artillery ...	143	3,223	22·5
	XXV Brigade, 1 Battery, Royal Artillery ...	73	1,542	21·1
SHAHJEHANPORE ...	37th Regiment, Head Quarters ...	488	8,631	17·7
MORADABAD ...	37th Regiment, Wing ...	308	5,552	18·0
BAREILLY ...	2-25th Regiment ...	800	17,458	21·8
	VIII Brigade, B Battery, Royal Artillery ...	144	2,165	15·0
ROORKEE ...	103rd Regiment, Head Quarters ...	301	6,225	20·7
MEERUT ...	4th Hussars ...	418	12,004	28·8
	105th Regiment ...	723	13,679	18·9
	A Brigade, C Battery, Royal Horse Artillery ...	148	3,461	23·4
	F Brigade, D Battery, Royal Horse Artillery ...	136	3,623	26·6
	XVI Brigade, F Battery, Royal Artillery ...	142	3,621	25·5
	XIX Brigade, D Battery, Royal Artillery ...	141	2,043	14·5
DELHI ...	103rd Regiment, Wing ...	252	4,483	17·8
	XXIV Brigade, 1 Battery, Royal Artillery ...	73	1,830	25·1
MUTTRA ...	11th Hussars ...	398	6,270	15·8
AGRA ...	88th Regiment† ...	652	11,228	17·2
	XIX Brigade, F Battery, Royal Artillery ...	140	5,553	39·6
	XXII Brigade, 7 Battery, Royal Artillery ...	70	1,909	27·3
MORAR ...	1-11th Regiment ...	852	19,691	23·1
	F Brigade, B Battery, Royal Horse Artillery ...	137	3,660	26·7
	XVI Brigade, C Battery, Royal Artillery ...	135	2,422	17·9
	XXV Brigade, 3 Battery, Royal Artillery ...	74	2,162	29·2
GWALIOR FORTRESS	XXIV Brigade, 2 Battery, Royal Artillery ...	75	1,555	20·7
JHANSI ...	2-1st Regiment* ...	798	21,200	26·6
	XIX Brigade, A Battery, Royal Artillery ...	145	5,145	35·5
SAUGOR ...	1-19th Regiment ...	822	19,469	23·7
	XVI Brigade, E Battery, Royal Artillery ...	147	2,911	19·8
	XXII Brigade, 6 Battery, Royal Artillery ...	67	1,100	16·4
JUBBULPORE ...	2-12th Regiment ...	802	25,750	32·1
	XVI Brigade, G Battery, Royal Artillery ...	140	3,659	26·1
UMBALLA ...	20th Hussars ...	427	7,258	17·0
	106th Regiment ..	878	14,264	16·2
	C. Brigade, F Battery, Royal Horse Artillery ...	139	2,790	20·1
	F Brigade, E Battery ...	137	2,914	21·2
JULLUNDUR ...	92nd Regiment ...	845	17,813	21·1
	XIX Brigade, G Battery, Royal Artillery ...	142	2,868	20·2
FEROZEPORE ...	39th Regiment ...	831	15,175	18·3
	XXII Brigade, B Battery, Royal Artillery ...	146	4,292	29·4
	XXII Brigade, 5 Battery, Royal Artillery ...	71	1,845	26·0
MOOLTAN ...	109th Regiment ...	818	17,755	21·7
	XIX Brigade, C Battery, Royal Artillery ...	143	2,235	15·6
	XXV Brigade, 2 Battery, Royal Artillery ...	70	1,524	21·8
SEALKOTE ...	5th Lancers ...	462	7,907	17·1
	68th Regiment ...	621	14,523	23·4
	A Brigade, E Battery, Royal Horse Artillery ...	126	2,786	22·1
UMRITSUR ...	XXII Brigade, 4 Battery, Royal Artillery ...	66	2,028	30·7
MEEAN MEER ...	85th Regiment ...	866	26,490	30·6
	F Brigade, F Battery, Royal Horse Artillery ..	140	2,238	16·0
	VIII Brigade, H Battery, Royal Artillery ...	144	3,540	24·6
	XXIV Brigade, 5 Battery, Royal Artillery ...	71	1,669	23·5
RAWULPINDEE ...	1-6th Regiment ...	847	18,046	21·3
	36th Regiment ...	711	18,990	26·7
	A Brigade, B Battery, Royal Horse Artillery ...	130	3,727	28·7
	XIX Brigade, E Battery, Royal Artillery ...	141	4,244	30·1
CAMPBELLPORE ...	XIX Brigade, B Battery, Royal Artillery ...	147	3,961	27·0
ATTOCK ...	XXIV Brigade, 6 Battery, Royal Artillery ...	66	1,527	23·1
NOWSHERA ...	104th Regiment ...	697	20,026	28·6
PESHAWUR ...	1-5th Regiment ...	896	28,696	32·0
	38th Regiment ...	821	27,046	32·9
	A Brigade, A Battery, Royal Horse Artillery ...	130	3,659	28·1
	A Brigade, D Battery, Royal Horse Artillery ...	129	3,495	27·1
	XXV Brigade, 4 Battery, Royal Artillery ...	75	2,302	30·7
DARJEELING ...	XXIV Brigade, 4 Battery, Royal Artillery ...	65	1,240	19·1
CHUCKRATA ...	55th Regiment ...	883	13,682	15·5
DUGSHAIE ...	1-3rd Regiment ...	874	7,472	8·5
SUBATHOO ...	41st Regiment ...	863	11,450	13·3
JUTOGH ...	XXII Brigade, A Battery, Royal Artillery ...	79	611	7·7
HUZARA ...	XXV Brigade, 5 Battery, Royal Artillery ...	86	546	6·3
ARMY OF THE PRESIDENCY ...	....	33,874	744,630‡	22·0

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* Including the Detachments noted in Table XIX. † Up to 15th November only.

‡ The number of Hospital diets on which the daily sick of Table I is calculated is 771,974. The addition of the Hospital diets of four regiments which spent a few weeks of 1870 in this Presidency, will contribute towards making up the deficiency between this total and that shown above; but the greater portion is due probably to the fact that many regiments have neglected to enter the diets of men absent at Convalescent Depôts and elsewhere.

EUROPEAN TROOPS, 1870.

XXI.

DISTRIBUTION of the EUROPEAN ARMY of the BENGAL PRESIDENCY on 1st July 1870.

(An Index to the two preceding Tables.)

STRENGTH OF THE ARMY ON 1st JULY 1870, 33,087.

	STATION.	STRENGTH.		STATION.	STRENGTH.
ARTILLERY.			**INFANTRY.**		
A. Horse Brigade, A. Battery ...	Peshawur ...	122	1st Regiment, 2nd Battalion ..	Jhansi .	372
B. ,, ...	Rawulpindee ...	117	,, ,, ...	Seepree ..	139
C. ,, and Hd. Qrs. ...	Meerut ...	141	,, ,, ...	Raneekhet ...	229
D. ,, ..	Peshawur ...	120	3rd ,, 1st ,, ...	Dugshaie	888
E. ,, ...	Sealkote ...	122	5th ,, 1st ,, ...	Peshawur	830
C. Horse Brigade, F. Battery ...	Umballa ...	128	6th ,, 1st ,, ...	Rawulpindee	498
F. Horse Brigade, Head Quarters ..	Umballa ...	7	,, ,, ...	Murree Hills	261
A. Battery ...	Benares ..	131	11th ,, 1st ,, ...	Morar	553
B. ,, ..	Morar .	131	,, ,, ...	Gwalior Fortress ...	228
C. ,, .	Lucknow ...	130	12th ,, 2nd ,, ...	Jubbulpore	500
D. ,, ...	Meerut ..	126	,, ,, ...	Nowgong ...	168
E. ,, ...	Umballa ...	125	14th ,, 1st ,, ...	Cawnpore .	677
F. ,, ...	Meean Meer ...	126	,, ,, ..	Allahabad ...	124
8th Brigade, B. Battery .	Dinapore ..	141	17th ,, 1st ,, ..	Lucknow .	779
C. ,, ...	Lucknow ..	143	19th ,, 1st ,, ...	Saugor ...	773
D. ,, ..	Bareilly ...	140	19th ,, 2nd ,, ...	Fort William ..	842
E. ,, ...	Fyzabad ...	129	25th ,, 2nd ,, ..	Bareilly ..	690
F. ,, ...	Seetapore ...	132	26th ,, ...	Fyzabad .	752
G. ,, ...	Cawnpore ...	138	36th ,, ...	Rawulpindee ...	442
H. ,, ..	Meean Meer ..	133	,, ...	Murree Hills ...	126
16th Brigade, A. Battery ...	Barrackpore ...	143	37th ,, Head Quarters ...	Shahjehanpore ..	287
B. ,, and Hd. Qrs. ...	Barrackpore ...	148	,, ..	Moradabad ..	287
C. ,, ..	Morar ...	130	,,	Raneekhet ..	169
D. ,, ..	Allahabad ...	134	38th ,, ..	Peshawur ...	762
E. ,, .	Saugor ...	125	39th ,, .	Ferozepore ...	780
F. ,, ...	Meerut ...	140	41st ,, ...	Subathoo .	833
G. ,, ...	Jubbulpore ...	134	55th ,, ...	Chuckrata ..	789
19th Brigade, Head Quarters ...	Peshawur ...	4	,, Depôt ..	Rae Bareilly	66
A. Battery ...	Jhansi ...	122	58th ,, ...	Sealkote .	425
B. ,, ...	Campbellpore ..	135	,,	Chumba Hills ...	150
C. ,, ..	Mooltan ...	134	60th ,, 2nd Battalion ...	Seetapore	397
D. ,, ...	Meerut ...	133	,, ,, Head Quarters ...	Benares .	363
E. ,, ...	Rawulpindee ...	123	62nd ,, ..	Lucknow ..	771
F. ,, ...	Agra ...	121	85th ,, ..	Meean Meer .	563
G. ,, ...	Jullundur ...	130	,, ..	Fort Lahore ...	64
22nd Brigade, Head Quarters ...	Morar ...	6	,, ...	Chumba Hills ..	123
A. Battery ...	Jutogh ...	90	88th ,, .	Agra .	653
B. ,, .	Ferozepore ...	134	92nd ,, ...	Jullundur .	480
3. ,, ...	Fort William ...	58	,, ..	Umritsur	63
4. ,, ...	Umritsur ..	67	,, ..	Dhurmsalla	108
5. ,, ..	Ferozepore .	61	,, ...	Chumba Hills .	161
6. ,, ..	Saugor ...	64	98th ,, ..	Dum-Dum	514
7. ,, ...	Agra ...	67	,, ..	Barrackpore	156
24th Brigade, Head Quarters ...	Meean Meer .	6	,, ...	Berhampore ...	135
1. Battery ...	Delhi ..	60	103rd ,, ...	Roorkee ..	301
2. ,, ...	Gwalior Fortress ...	70	,, ...	Delhi	257
3. ,, ...	Lucknow ...	62	104th ,,	Nowshera .	451
4. ,, ..	Darjeeling ...	65	,, ..	Attock .	96
5. ,, ...	Meean Meer & Fort Lahore	69	,, ...	Murree Hills	100
6. ,, ...	Attock ...	55	105th ,, ...	Meerut	467
25th Brigade, Head Quarters ...	Allahabad ...	6	,, ...	Futtehghur ...	228
1. Battery ...	Allahabad ...	74	106th ,, ..	Umballa	709
2. ,, ...	Mooltan ...	65	107th ,, ...	Hazareebaugh ..	846
3. ,, ..	Morar ..	66	109th ,, ...	Mooltan ..	519
4. ,, ...	Peshawur ...	65	,, .	Dera Ismael Khan ...	98
5. ,, ...	Huzara ...	65	,, ...	Chumba Hills	99
Sappers and Miners ...	Chuckrata ...	20	3rd Battalion, Rifle Brigade ..	Dinapore ..	706
,, ,, Depôt ...	Roorkee ...	16	,, ...	Chunar ...	65
			CONVALESCENT DEPOTS.		
			,, ...	Darjeeling ...	128
CAVALRY.			,, ...	Nynee Tal ..	380
			,, ...	Landour ..	210
5th Lancers ..	Sealkote ...	458	,, ...	Kussowlie ...	508
4th Hussars ...	Meerut .	420	,, ...	Dalhousie ...	109
11th Hussars ...	Muttra ...	350	,, ...	Murree ...	496
20th Hussars .	Umballa ...	387	**PRESIDENCY DEPOT.**		
21st Hussars .	Lucknow ...	418	,, ...	Chinsurah ..	25

WOMEN AND CHILDREN OF EUROPEAN REGIMENTS, 1870.

WOMEN AND CHILDREN OF EUROPEAN REGIMENTS, 1870.

I.

TABLE showing the SICKNESS and MORTALITY among the WOMEN of the EUROPEAN REGIMENTS serving in the BENGAL PRESIDENCY during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths in each Month.	Death-rate of the Year per 1,000 of Strength.	Causes of Deaths. Cholera.	Smallpox.	Intermittent Fevers.	Remittent and Continued Fevers.	Heat Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Phthisis Pulmonalis.	Respiratory Diseases.	Heart Diseases.	Atrophy and Anæmia.	Childbirth and Abortion.	All other Causes.
January ...	3,473	100	28·8	6	...	...	...	...	2	...	1	...	...	1	1	...	...	...	1
February ...	3,399	110	32·4	4	...	...	...	...	1	...	...	...	...	1	...	...	2	...	...
March ...	3,525	115	32·6	3	...	...	...	...	...	1	...	1	...	...	...	...	...	1	...
April ...	3,576	129	36·1	12	...	7	...	...	1	...	...	1	2	...	...	1	...	...	...
May ...	3,578	192	53·7	15	...	3	...	...	5	1	2	...	1	1	...	...	...	2	...
June ...	3,568	210	58·8	12	...	1	...	...	6	3	...	...	...	1	...	...	...	1	...
July ...	3,545	221	62·3	11	...	2	...	...	2	5	...	...	...	1	...	1	...	...	...
August ...	3,528	258	73·1	15	...	...	...	1	...	...	1	1	1	5	1	1	1	2	1
September ...	3,514	230	65·4	14	...	...	...	...	5	...	2	1	1	1	...	1	1	1	1
October ...	3,542	230	65·0	11	...	...	...	...	...	...	2	2	1	2	1	...	...	3	...
November ...	3,515	172	48·9	7	...	...	...	...	2	...	1	...	...	1	1	...	...	1	1
December ...	3,407	119	34·3	5	...	...	...	...	2	1	...	1	...	...	...	1	...	...	...
						13	...	1	26	11	9	7	6	14	4	5	4	11*	4
						Died per 1,000 of Strength.													
For the year ...	3,519	174	49·5	115	32·68	3·69	...	7·67		3·13	4·55		1·70	3·97	1·14	1·42	1·14	3·13	1·14

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month. Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
Cholera ...	...	...	1	10	2	1	5	...	...	...	...	...	19	5·4	68·4
Smallpox ...	...	...	...	1	2	...	...	...	...	...	...	...	3	·9	...
Intermittent Fevers ...	47	42	30	58	116	98	111	132	135	155	189	97	1,219	346·4	...
Remittent and Continued Fevers ...	14	16	28	29	114	70	59	64	49	61	36	13	556	158·0	4·7
Heat Apoplexy ...	...	...	1	...	2	3	5	...	...	...	...	...	11	3·1	100·0
Dysentery ...	5	7	8	17	17	16	10	24	11	10	14	9	148	42·1	6·1
Diarrhœa ...	3	16	15	28	22	20	31	47	33	27	22	2	266	75·6	2·6
Hepatitis ...	3	3	5	6	10	12	6	7	8	8	1	5	74	21·0	8·1
Spleen Disease ...	1	2	1	1	3	2	2	3	...	2	2	...	19	5·4	...
Respiratory Diseases ...	9	11	10	13	15	9	9	14	8	11	12	13	134	38·1	3·0
Phthisis Pulmonalis ...	3	4	4	3	6	4	4	4	...	4	4	2	42	11·9	33·3
Anæmia and Debility ...	12	25	37	51	85	63	53	60	48	58	59	38	589	167·4†	·7
Rheumatism ...	4	3	8	7	5	7	6	8	5	7	1	2	62	17·6	...
Eye Diseases ...	1	7	9	27	14	11	21	72	34	16	7	6	225	63·9	...
Childbirth‡ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Abortion ...	5	4	4	5	12	10	9	4	2	5	3	4	67	19·0	3·0
Diseases peculiar to Women ...	6	13	10	10	17	14	9	10	10	3	5	2	109	31·0	1·0
Abscess and Ulcer ...	4	8	13	5	6	8	10	8	4	12	12	4	94	26·7	
Injuries ...	1	3	2	3	4	3	3	3	6	2	2	2	34	9·7	
All other causes ...	18	16	35	33	45	35	31	58	27	21	22	12	353	100·3	
	136	180	230	307	497	386	383	518	380	405	391	211	4,024		
	Admitted per 1,000 of the Average Strength in each Month.														
	39·1	53·0	65·2	85·8	138·9	108·2	108·0	146·8	108·1	114·3	111·2	60·8	1143·5‡		

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* For the causes of these deaths, see Table VII.

† Cases of debility following Childbirth are included under this heading.

‡ Cases of Childbirth being no longer reckoned as Admissions into Hospital, the admission-rate is diminished by the exclusion of this item.

WOMEN AND CHILDREN OF EUROPEAN REGIMENTS, 1870.

II.

TABLE showing the SICKNESS and MORTALITY among the CHILDREN of the EUROPEAN REGIMENTS serving in the BENGAL PRESIDENCY during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths in each Month.	Death-rate of each Month per 1,000 of Strength.	Causes of Deaths. Cholera.	Smallpox.	Measles.	Hooping Cough.	Intermittent Fevers.	Remittent and Continued Fevers.	Heat Apoplexy.	Dentition.	Convulsions.	Meningitis and Hydrocephalus.	Tabes Mesenterica.	Phthisis Pulmonalis.	Dysentery.	Diarrhœa.	Anæmia and Atrophy.	Bronchitis and Pneumonia.	Croup and Diphtheria.	All other Causes.
January ...	5,489	110	20·0	23	4·19	...	...	...	...	...	1	...	2	3	...	3	...	...	5	2	4	2	1
February ...	5,385	96	17·8	13	2·41	...	...	...	...	2	...	...	1	5	...	...	...		...	1	1	2	1
March ...	5,557	140	25·2	18	3·24	...	...	...	1	...	2	...	1	1	...	1	...	3	5	1	2	...	1
April ...	5,598	202	36·1	32	5·72	2	...	...	...	1	2	...	8	3	...	1	...	3	6	4	2	...	...
May ...	5,693	288	50·6	48	8·43	1	...	...	...	1	9	...	5	4	3	...	...	3	14	7	...	...	1
June ...	5,721	280	48·9	37	6·47	2	...	...	...	...	8	...	3	5	...	2	...	...	6	8	...	1	2
July ...	5,645	269	47·6	39	6·91	3	...	...	...	1	6	...	4	7	1	1	...	...	11	4	1	...	...
August ...	5,704	380	66·6	58	10·17	1	...	...	...	...	3	...	13	5	1	2	...	4	17	10	...	...	2
September ...	5,720	362	63·3	57	9·97	...	...	...	...	1	4	...	7	9	4	3	...	4	12	8	1	2	2
October ...	5,787	308	53·2	41	7·08	...	...	...	...	5	7	...	2	3	1	1	1	1	9	4	1	1	5
November ...	5,743	253	44·1	63	10·97	...	...	...	...	17	5	1	2	4	2	...	...	1	11	13	2	2	3
December ...	5,690	161	28·3	32	5·62	...	...	...	2	4	3	...	2	4		1	1	...	5	7	3	...	...
						9	...	...	3	32	50	1	50	53	12	15	2	10	101	69	17	10	18
						Died per 1,000 of Strength.																	
For the year ...	5,644	237	42·0	461	81·68	1·59	...	...	·53	5·67	8·86	·18	8·86	9·39	2·13	2·66	·35	1·77	17·89	12·23	3·01	1·77	3·19

CAUSES OF ADMISSIONS.	Numbers of Admissions into Hospital in each Month. Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
Cholera	...	...	...	2	1	2	3	1	...	...	..	...	9	1·6	100·0
Smallpox	...	...	1	...	1	...	...	...	...	...	..	...	2	·4	..
Measles	...	1	1	4	16	3	1	...	...	1	2	7	36	6·4	...
Hooping Cough ...	1	5	9	1	5	4	1	...	...		6	2	34	6·0	8·8
Intermittent Fevers ...	22	21	31	37	86	63	54	84	75	180	214	90	956	169·4	3·4
Remittent and Continued Fevers ...	7	11	33	41	98	70	58	60	89	60	51	11	598	105·9	8·3
Heat Apoplexy ...	...	...	...	...	...	...	1	1	2	...	1	...	5	·9	20·0
Dysentery	6	...	12	16	20	9	19	35	12	11	10	3	153	27·1	12·4
Diarrhœa	15	22	48	80	78	40	77	130	66	47	56	14	679	120·3	14·9
Hepatitis	...	1	1	...	2	...	2	1	1	...	1	...	9	1·6	...
Spleen Disease ...	1	1	...	...	...	1	1	2	...	...	...	...	6	1·1	...
Respiratory Diseases ...	20	19	19	19	21	15	9	12	18	20	16	12	200	35·4	13·5
Eye Diseases ...	1	9	23	83	97	33	80	239	134	65	22	6	792	140·3	...
Anæmia and Debility ...	9	17	19	32	62	49	36	41	28	37	40	32	402	71·2	17·2
Tubercular Diseases ...	5	4	5	6	10	4	2	4	4	5	8	2	59	10·5	39·0
Meningitis and Hydrocephalus	...	...	1	3	4	1	3	1	3	3	3	...	22	3·9	54·5
Convulsions	1	5	1	4	4	6	8	8	13	4	4	3	61	10·8	86·9
Dentition	13	16	24	35	40	18	25	42	20	15	12	7	273	48·4	18·3
Abscess and Ulcer ...	4	3	5	5	10	11	8	5	6	7	2	3	69	12·2	4·1
Injuries	1	5	10	8	9	6	4	13	3	5	3	2	69	12·2	
All other causes ...	5	2	23	12	29	18	10	16	17	11	11	4	158	28·0	
	111	142	266	388	593	352	402	710	497	471	482	198	4,592		
	Admitted per 1,000 of the Average Strength in each Month.														
	20·2	26·4	47·9	69·3	104·2	61·5	71·2	124·5	86·9	81·4	80·4	34·8	813·6		

WOMEN AND CHILDREN OF EUROPEAN REGIMENTS, 1870.

III.

TABLE showing the DISTRIBUTION by STATIONS of the DEATHS of the WOMEN of EUROPEAN REGIMENTS.

STATIONS.	Average Strength for the period of observation.	Causes of Deaths.														Total Deaths of the Year.	Died per 1,000 of Strength.		
		Cholera.	Smallpox.	Intermittent Fevers.	Remittent and Continued Fevers.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Phthisis Pulmonalis.	Respiratory Diseases.	Heart Diseases.	Atrophy and Anæmia.	Childbirth and Abortion.	All other Causes.		A. Cholera.	B. All other Causes.	C. All Causes.
Chinsurah Depôt	12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fort William	107	...	...	...	...	1	...	...	1	1	...	...	...	...	...	3	...	...	28·04
Dum-Dum	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Barrackpore	48	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Berhampore (6 months)	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	218	...	...	...	...	1	...	...	1	1	...	...	...	...	...	3	...	...	13·76
Hazareebaugh	80	2	...	...	...	...	...	...	...	...	...	...	...	...	1	3	25·00	12·50	37·50
Dinapore	95	2	...	...	...	...	...	...	...	...	...	...	...	...	...	2	21·05	...	21·05
Benares	57	...	...	...	1	...	...	...	...	...	...	1	...	...	...	2	...	...	35·09
Chunar	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fyzabad	90	8	...	...	...	...	1	...	1	...	...	...	...	...	...	10	88·89	22·22	111·11
Rae Bareilly (11 months)	61	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	16·39
Lucknow	260	...	...	...	6	1	...	...	...	...	...	...	1	...	...	8	...	...	30·77
Seetapore	66	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	15·15
Futtehghur	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cawnpore	93	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	10·75
Allahabad	36	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	27·78
	860	12	...	...	8	1	2	...	1	...	...	1	2	1	1	29	13·95	19·77	33·72
Shahjehanpore	42	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	23·81
Moradabad	26	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	38·46
Bareilly	72	...	...	...	...	...	...	1	...	1	...	...	...	...	...	2	...	...	27·78
Roorkee	32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meerut	177	...	...	1	...	...	1	1	1	2	...	1	...	...	...	7	...	...	39·55
Delhi	20	1	...	...	...	1	...	...	...	...	...	...	...	...	...	2	50·00	50·00	100·00
Muttra	51	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	420	1	...	1	...	1	2	2	1	3	...	1	...	...	1	13	2·38	28·57	30·95
Agra	68	...	...	...	...	1	1	1	...	...	...	...	...	...	...	3	...	...	44·12
Morar	113	...	...	...	2	...	1	...	...	1	1	2	...	1	...	8	...	...	70·80
Gwalior Citadel	30	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	33·33
Seepree (7 months)	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jhansi	49	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	20·41
Nowgong	20	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	50·00
Saugor	85	...	...	...	...	1	...	1	...	...	...	...	...	...	...	2	...	...	23·53
Jubbulpore	58	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	17·24
	432	...	...	...	2	2	2	3	...	1	2	2	1	2	...	17	...	...	39·35
Umballa	120	...	...	...	...	...	...	1	...	...	...	...	1	1	...	3	...	...	25·00
Jullundur	81	...	...	...	4	...	...	...	...	...	...	...	...	...	...	4	...	...	49·38
Ferozepore	118	...	...	...	...	2	...	...	...	2	...	...	...	3	1	8	...	...	67·80
Mooltan	105	...	...	...	2	...	1	...	...	...	...	...	...	...	...	3	...	...	28·57
Sealkote	121	...	...	...	2	...	...	...	...	...	...	...	...	...	...	2	...	...	16·53
Umritsur	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fort Lahore	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meean Meer	122	...	...	...	...	...	1	1	...	1	...	...	...	...	...	3	...	...	24·59
Rawulpindee	137	...	...	...	1	1	...	...	...	1	1	...	...	2	...	6	...	...	43·80
Campbellpore (8 months)	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attock	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowshera	39	...	...	...	2	...	1	...	1	1	...	...	...	...	...	5	...	...	128·21
Peshawur	183	...	...	...	4	2	...	...	...	1	1	...	...	...	1	9	...	...	49·18
	1,048	...	...	...	15	5	3	2	1	6	2	...	1	6	2	43	...	...	41·03
Darjeeling	11	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	90·91
Nynee Tal (9 months)	35	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	28·57
Raneekhet (9 months)	38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Landour (8 months)	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chuckrata	37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kussowlie (9 months)	58	...	...	...	...	...	...	...	...	3	...	1	...	1	...	5	...	...	86·21
Dugshai	93	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	10·75
Subathoo (10 months)	91	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	10·99
Jutogh (9 months)	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kangra and Dhurmsalla (10 months)	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Huzara Hills (6 months)	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree Family Camp (6 months)	127	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	7·87
	422*	...	...	...	1	1	...	...	2	3	...	1	...	2	...	10	...	...	23·70
On the march	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
BENGAL PRESIDENCY	3,519	13	...	1	26	11	9	7	6	14	4	5	4	11	4	115	3·69	28·99	32·68

* As for the year.

WOMEN AND CHILDREN OF EUROPEAN REGIMENTS, 1870.

IV.

TABLE showing the DISTRIBUTION by STATIONS of the DEATHS of the CHILDREN of EUROPEAN REGIMENTS.

STATIONS.	Average Strength for the period of observation.	Causes of Deaths.																		Total Deaths of the Year.	Died per 1,000 of Strength.		
		Cholera.	Smallpox.	Measles.	Hooping Cough.	Intermittent Fevers.	Remittent and Continued Fevers.	Heat Apoplexy.	Dentition.	Convulsions.	Meningitis and Hydrocephalus.	Tabes Mesenterica.	Phthisis Pulmonalis.	Dysentery.	Diarrhoea.	Anaemia and Atrophy.	Bronchitis and Pneumonia.	Croup and Diphtheria.	All other Causes.		A. Cholera.	B. All other Causes.	C. All Causes.
Chinsurah Depôt ...	20	...	...	..	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	..
Fort William ...	162	...	...	...	...	...	1	...	...	2	1	..	...	...	2	...	1	...	...	7	...	...	43·21
Dum-Dum ...	116	...	...	...	..	...	1	...	...	...	...	...	...	...	1	1	1	...	...	4	...	...	34·48
Barrackpore ...	94	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	1	3	...	...	31·91
Berhampore (6 months) ...	14	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	71·43
	379	...	...	..	...	...	2	...	...	4	1	...	...	1	3	1	2	...	1	15	...	...	39·58
Hazareebaugh ...	121	5	...	...	...	...	...	...	...	3	...	...	...	...	2	1	...	...	...	10	41·32	41·32	82·65
Dinapore ...	173	2	...	...	...	...	...	...	1	3	...	...	1	...	2	3	1	...	1	14	11·56	69·36	80·92
Benares ...	84	...	...	...	...	1	1	...	...	4	...	...	...	...	...	...	...	1	...	7	...	...	83·33
Chunar ..	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fyzabad ...	135	2	...	...	...	...	2	...	4	2	...	2	1	1	1	1	2	...	...	18	14·81	118·52	133·33
Rae Bareilly ...	119	...	...	...	...	..	..	...	4	...	...	...	...	...	...	...	...	...	1	5	...	...	42·02
Lucknow .	386	.	.	...	2	...	7	...	4	2	...	...	...	3	15	5	1	...	...	39	...	...	101·04
Seetapore ...	98	...	...	...	...	...	..	..	1	1	...	1	...	1	2	...	...	...	...	6	...	...	61·22
Futtehghur ..	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cawnpore ...	113	...		...	...	...	3	...	6	2	.	...	...	...	3	2	1	...	1	18	...	...	159·29
Allahabad ...	59	.	...	...	...	.	...	...	...	...	...	...	...	...	2	...	1	...	...	3	...	...	50·85
	1,339	9	...	...	2	1	13	...	20	16	...	3	2	5	27	12	6	1	3	120	6·72	82·90	89·62
Shahjehanpore ...	81	...	...	...	...	...	1	...	5	1	...	...	...	1	...	...	...	...	1	9	...	...	111·11
Moradabad ...	37	...	...	...	...	...	1	...	...	1	...	...	...	...	2	...	...	...	...	4	...	...	108·11
Bareilly ...	126	...	...	...	...	..	...	..	...	2	...	...	...	...	3	1	1	1	...	8	...	...	63·49
Roorkee ..	51	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	1	...	...	1	...	...	19·61
Meerut ...	327	...	...	...	...	1	5	...	6	4	3	2	...	5	12	5	...	...	2	45	...	...	137·61
Delhi ...	43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Muttra ...	78	...	...	...	...	...	1	...	...	...	...	...	...	...	.	...	...	1	...	2	...	...	25·64
	743	..	...	...	...	1	8	...	11	8	3	2	...	6	17	6	2	2	3	69	...	...	92·87
Agra ..	127	...	...	...	...	1	2	...	..	...	...	...	...	...	2	2	...	...	1	8	...	...	63·00
Morar ...	227	...	..	...	...	...	2	...	2	4	2	1	...	...	4	3	1	...	2	21	...	...	92·51
Gwalior Citadel ...	38	...	...	...	...	...	...	...	1	...	...	...	...	...	3	3	...	...	...	7	...	...	184·21
Seepree (8 months) ...	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.	..	...	...	...
Jhansi ...	62	...	...	...	...	...	..	...	...	...	...	...	...	1	...	3	...	..	1	5	...	...	80·64
Nowgong ...	28	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	..	2	...	...	71·43
Saugor ...	125	...	...	...	...	1	2	..	...	...	...	...	...	...	...	2	...	4	1	10	...	...	80·00
Jubbulpore ...	88	...	...	...	...	1	...	...	...	...	...	...	...	...	1	1	...	...	1	4	...	...	45·45
	707	...	...	...	...	3	6	1	3	4	2	2	...	1	10	14	1	4	6	57	...	...	80·62
Umballa ...	177	...	...	...	...	...	...	...	1	...	1	1	...	1	3	2	...	...	1	10	...	...	56·50
Jullundur ...	114	...	...	...	...	...	...	...	2	5	...	..	...	...	...	1	..	..	...	8	...	...	70·17
Ferozepore ...	147	...	...	...	...	...	...	...	1	...	...	...	...	...	9	9	1	...	3	23	...	...	156·46
Mooltan ...	156	...	...	...	1	...	2	...	...	3	3	...	...	...	...	1	3	...	...	13	...	...	83·33
Sealkote ...	238	...	...	...	...	...	2	...	...	2	...	...	...	...	...	1	...	...	...	5	...	...	21·01
Umritsur ...	22	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	..	1	...	...	45·45
Fort Lahore ...	1	...	...	...	...	...	...	...	...	...	...	..	...	..	...	...	...	..	...	...	...	...	...
Meean Meer	180	...	...	...	...	...	..	...	1	4	...	1	...	...	11	2	..	..	...	19	...	...	105·55
Rawulpindee ..	157	...	...	...	...	1	...	...	...	4	1	1	...	...	4	2	...	...	1	14	...	...	89·17
Campbellpore (8 months) ...	21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attock ..	13	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...
Nowshera ...	57	...	...	..	...	1	...	...	...	...	...	...	...	1	2	...	...	...	...	4	..	...	70·18
Peshawur ..	313	...	...	...	...	25	18	...	5	2	...	...	..	2	2	9	1	..	..	59	...	...	188·50
	1,589	...	..	..	1	27	17	...	10	20	5	4	...	4	31	27	5	...	5	156	...	...	98·17
Darjeeling ...	17	...	...	..	...	...	...	...	...	...	...	...	...	...	...	..	.	...	...	...	...	..	...
Nynee Tal (9 months) ...	62	...	.	...	...	..	1	...	...	...	...	...	...	...	1	...	..	...	..	2	...	...	32·26
Raneekhet (9 months) ...	69	...	.	...	..	...	...	...	...	1	...	...	...	...	...	3	...	...	...	4	..	...	57·97
Landour (8 months) ...	40	...	...	...	...	...	...	...	...	...	..	...	...	1	...	1	...	..	...	2	..	...	50·00
Chuckrata ..	65	...	...	...	..	...	...	...	...	...	...	1	..	...	...	1	...	...	...	2	...	...	30·77
Kussowlie (9 months) ...	107	...	...	...	...	...	1	...	2	...	...	2	...	...	...	1	...	...	...	6	...	...	56·07
Dugshaie ...	135	...	...	...	...	...	2	...	...	...	...	...	...	..	2	1	...	...	...	5	...	...	37·04
Subathoo (10 months) ...	144	...	...	...	..	..	...	...	...	...	...	...	...	1	3	...	...	3	...	7	..	...	48·61
Jutogh (9 months) ...	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...
Kangra and Dhurmsalla (10 months) ...	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Huzara Hills (6 months) ...	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree Family Camp (6 months) ..	231	...	.	...	...	...	...	..	2	...	...	...	...	...	5	2	...	...	...	9	...	...	38·96
	702*	...	...	...	...	...	4	...	4	1	...	3	...	2	11	9	...	3	...	37	..	..	52·71*
On the march ...	...	...	...	...	...	...	...	...	2	...	1	...	...	...	2	...	1	...	.	6	...	...	...
Bengal Presidency ...	5,644	9	...	...	3	32	50	1	50	53	12	15	2	19	101	69	17	10	18	461	1·59	80·09	81·68

* As for the year.

WOMEN AND CHILDREN OF EUROPEAN REGIMENTS, 1870.

V.

TABLE showing the DISTRIBUTION by STATIONS of the CHOLERA of the WOMEN of EUROPEAN REGIMENTS.

STATIONS.	Average Strength for the period of observation.	Number of Admissions from Cholera in each Month.												Total Admissions of the Year.	Deaths of the Year.	Death-rate per 1,000 of Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Chinsurah Depôt ...	12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fort William ...	107	...	...	1	1	...	...	...	...	...	...	...	...	2	...	...
Dum-Dum ...	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Barrackpore ...	48	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Berhampore (6 months) ...	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	218	...	...	1	1	...	...	...	...	...	...	...	...	2	...	...
Hazareebaugh ...	80	...	...	...	...	...	...	4	...	...	...	...	...	4	2	25·00
Dinapore ...	95	...	...	...	...	1	1	1	...	...	...	...	...	3	2	21·05
Benares ...	57	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chunar ...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fyzabad ...	90	...	...	...	8	1	...	...	...	...	...	...	...	9	8	88·89
Rae Bareilly ...	61	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lucknow ...	260	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Seetapore ...	66	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Futtehghur ...	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cawnpore ...	98	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Allahabad ...	36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	860	...	...	...	8	2	1	5	...	...	...	...	...	16	12	13·95
Shahjehanpore ...	42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Moradabad ...	26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bareilly ...	72	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Roorkee ...	32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meerut ...	177	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Delhi ...	20	...	...	...	1	...	...	...	...	...	...	...	...	1	1	50·00
Muttra ...	51	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	420	...	...	...	1	...	...	...	...	...	...	...	...	1	1	2·38
Agra ...	68	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Morar ...	113	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gwalior Citadel ...	30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Seepree (7 months) ...	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jhansi ...	49	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowgong ...	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Saugor ...	85	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jubbulpore ...	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	432	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Umballa ...	120	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jullundur ...	81	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ferozepore ...	118	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mooltan ...	105	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sealkote ...	121	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Umritsur ...	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fort Lahore ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meean Meer ...	122	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rawulpindee ...	137	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Campbellpore (8 months) ...	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attock ...	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowshera ...	39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Peshawur ...	183	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	1,048	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Darjeeling ...	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nynee Tal (9 months) ...	35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Raneekhet (9 months) ...	38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Landour (8 months) ...	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chuckrata ...	37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kussowlie (9 months) ...	58	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dugshale ...	93	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Subathoo (10 months) ...	91	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jutogh (9 months) ...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kangra and Dhurmsalla (10 months) ...	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Huzara Hills (6 months) ...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree Family Camp (6 months) ...	127	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	422	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
On the march ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
BENGAL PRESIDENCY ...	3,519	...	...	1	10	2	1	5	...	...	...	...	...	19	13	3·69

WOMEN AND CHILDREN OF EUROPEAN REGIMENTS, 1870.

VI.

TABLE showing the DISTRIBUTION by STATIONS of the CHOLERA of the CHILDREN of EUROPEAN REGIMENTS.

STATIONS.	Average Strength for the period of observation.	Number of Admissions from Cholera in each Month.												Total Admissions of the Year.	Deaths of the Year.	Death-rate per 1,000 of Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Chinsurah Depôt	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fort William	162	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dum-Dum	116	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Barrackpore	94	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Berhampore (6 months)	14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	379	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hazareebaugh	121	...	...	...	...	...	2	3	...	...	...	...	...	5	5	41·32
Dinapore	173	...	...	...	...	1	...	...	1	...	...	...	...	2	2	11·56
Benares	84	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chunar	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fyzabad	135	...	...	...	2	...	...	...	...	...	...	...	...	2	2	14·82
Rae Bareilly	119	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lucknow	380	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Seetapore	98	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Futtehghur	47	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cawnpore	113	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Allahabad	59	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	1,330	...	...	...	2	1	2	3	1	...	...	...	...	9	9	6·72
Shahjehanpore	81	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Moradabad	37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bareilly	126	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Roorkee	51	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meerut	327	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Delhi	43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Muttra	78	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	748	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Agra	127	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Morar	227	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gwalior Citadel	38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Seepree (8 months)	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jhansi	62	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowgong	28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Saugor	125	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jubbulpore	88	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	707	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Umballa	177	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jullundur	114	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ferozepore	147	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mooltan	156	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sealkote	238	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Umritsur	22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fort Lahore	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meean Meer	180	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rawulpindee	157	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Campbellpore (8 months)	21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attock	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowshera	57	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Peshawur	313	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	1,680	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Darjeeling	17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nynee Tal (9 months)	62	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Raneekhet (9 months)	69	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Landour (8 months)	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chuckrata	65	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kussowlie (9 months)	107	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dugshaie	135	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Subathoo (10 months)	144	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jutogh (9 months)	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kangra and Dhurmsalla (10 months)	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Huzara Hills (6 months)	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murree Family Camp (6 months)	231	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	702	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
On the march	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
BENGAL PRESIDENCY	5,644	...	...	...	2	1	2	3	1	...	...	...	...	9	9	1·59

WOMEN AND CHILDREN OF EUROPEAN REGIMENTS, 1870.

VII.

DETAIL of the ADMISSIONS and DEATHS of the WOMEN and CHILDREN of EUROPEAN REGIMENTS.

WOMEN.

AVERAGE STRENGTH, 3,519.

Admitted during the year ... 4,024. Per 1,000 of Strength ... 1143·50
Died ... ... 115. Per 1,000 of Strength ... 32·68

CAUSES OF ADMISSIONS AND DEATHS.	Admitted.	Died.	Admitted per 1,000 of Strength.	Died per 1,000 of Strength.
Cholera ...	19	13	5·4	3·69
Smallpox ...	3	...	·9	...
Chickenpox ..	2	...	...	...
Measles ...	2	...	...	...
Scarlatina ...	1	...	...	...
Parotitis ...	2	...	...	...
Erysipelas ...	5	...	...	...
Pyæmia (from retained placenta) ...	1	1*	...	...
Intermittent Fevers ...	1,219	1	346·4	7·67
Remittent and Continued Fevers ...	556	26	158·0	
Rheumatism ..	62	...	17·6	...
Primary Syphilis ...	3	...	...	...
Secondary Syphilis ...	1	...	...	...
Scrofula ...	2	...	...	...
Phthisis Pulmonalis ..	42	14	11·9	3·97
Anæmia ...	259	4	...	...
Scurvy ...	1	...	...	...
Sunstroke ...	11	10	3·1	3·13
Apoplexy ...	1	1	...	
Paralysis ...	2	...	...	...
Epilepsy ...	6	...	...	...
Neuralgia ...	24	...	...	...
Cephalæa ...	3	...	...	...
Mania ...	10	2*	...	...
Dementia ..	1	...	...	...
Ophthalmia ...	225	...	63·9	...
Otitis .	5	...	...	...
Epistaxis ..	1	...	...	...
Palpitation ..	4	...	...	...
Heart Disease ...	9	5	...	1·42
Pericarditis ...	1	1	...	...
Tonsillitis .	36	...	38·1	1·14
Laryngitis ...	2	1		
Bronchitis ...	81	2		
Asthma ...	2	...		
Pleurisy ...	4	...		
Pneumonia	9	1		
Stomatitis ...	2	...	...	...
Gastritis ...	1	...	...	...
Enteritis .	1	1	...	...
Peritonitis .	3	2	...	...
Dyspepsia	141	...	...	...
Obstipation ..	10	...	...	...
Colic ...	39	...	...	...
Hæmorrhoids	18	...	...	...
Tapeworm .	8	...	...	...
Jaundice	11	...	...	...
Hepatitis	74	6	21·0	1·70
Spleen Disease	19	...	5·4	...
Dysentery	148	9	42·1	4·55
Diarrhœa .	266	7	75·6	
Nephritis	4	...	...	...
Ischuria	4	...	...	...
Gonorrhœa .	1	...	...	...
Amenorrhœa	11	...	31·0	...
Dysmenorrhœa	3	...		
Menorrhagia .	35	...		
Ovaritis	3	...		
Ovarian Tumour	2	...		
Ulcer of Uterus ...	5	...		
Cancer of Uterus	1	...		
Leucorrhœa .	8	...		
Prolapsus of Uterus .	10	...		
Metritis ...	4	1*		
Retained Placenta .	1	...		
Uterine Hæmorrhage	5	2*		
Placenta Prævia ...	2	1*		
Puerperal Convulsions	1	...		
Hysteria	17	...		
Pelvic Abscess	1	..		
Abortion ...	67	2*	19·0	...
Synovitis ...	2	...	...	...
Necrosis	3	...	...	...
Abscess .	56	...	26·7	...
Ulcer ...	26	...		
Boils	11	...		
Carbuncle ...	1	...		
Skin Diseases .	13	...	...	...
Tumour	1	...	...	...
Debility	330	2*	167·4‡	1·14‡
Ebriositas	1	...	...	...
Injuries .	34	...	9·7	...
Cause not ascertained .	3	...	...	...
Childbirth and Abortion ..	...	(11)	...	3·13
Ratio for all causes not specially calculated ...	...	...	100·3	1·14
	4,024	115	1143·5	32·68

CHILDREN.

AVERAGE STRENGTH, 5,644.

Admitted during the year ... 4,592. Per 1,000 of Strength ... 813·60
Died ... ... 461. Per 1,000 of Strength ... 81·68

CAUSES OF ADMISSIONS AND DEATHS.	Admitted.	Died.	Admitted per 1,000 of Strength.	Died per 1,000 of Strength.
Cholera ...	9	9	1·6	1·59
Smallpox ...	2	...	·4	...
Chickenpox ...	9	...	...	...
Measles ...	36	...	6·4	...
Hooping Cough ...	34	3	6·0	·53
Parotitis ...	5	...	...	...
Scarlatina ...	3	...	...	...
Hydrophobia ...	...	1	...	...
Erysipelas ...	3	1	...	...
Intermittent Fevers ...	956	32	169·4	5·67
Remittent and Continued Fevers ...	598	50	105·9	8·86
Rheumatism ...	5	...	...	...
Secondary Syphilis ...	4	1	...	...
Scrofula ...	18	4	10·5	4·08
Tabes Mesenterica ...	32	15		
Phthisis Pulmonalis ...	3	2		
Hip-joint Disease ...	5	...		
Psoas Abscess ...	1	2		
Anæmia ...	173	...†	...	...
Scurvy ...	2	...	...	...
Sunstroke ...	5	1	·9	·18
Chorea ...	1	...	...	...
Epilepsy ...	3	...	...	...
Neuralgia ...	1	...	...	...
Meningitis ...	9	5	3·9	2·13
Hydrocephalus ...	13	7		
Convulsions ...	61	53	10·8	9·39
Ophthalmia ...	792	...	140·3	...
Otitis ...	9	...	...	...
Heart Disease ...	1	...	...	...
Palpitation ...	1	...	...	...
Tonsillitis ...	32	1	35·4	4·78
Croup ...	26	9		
Bronchitis ...	131	15		
Asthma ...	1	...		
Pleurisy ...	2	...		
Pneumonia ...	8	2		
Stomatitis ...	1	...	...	...
Aphtha ...	6	1	...	...
Gastritis ...	1	1	...	...
Enteritis ...	...	1	...	...
Dyspepsia ...	15	...	...	...
Obstipation ...	3	...	...	...
Colic ...	3	...	...	...
Hæmorrhoids ...	2	...	...	...
Hernia ...	1	...	...	...
Tapeworm ...	20	...	...	...
Jaundice ...	6	1	...	...
Hepatitis ...	9	...	1·6	...
Spleen Disease ...	6	...	1·1	...
Dysentery ...	153	19	27·1	3·37
Diarrhœa ...	679	101	120·3	17·89
Nephritis ...	1	...	...	...
Ischuria ...	2	...	...	...
Phimosis ...	1	...	...	...
Leucorrhœa ...	1	...	...	...
Amenorrhœa ...	1	...	...	...
Curvature of Spine ...	2	...	...	...
Harelip ...	2	...	...	...
Spina Bifida ...	1	1	...	...
Dentition ..	273	50	48·4	8·86
Synovitis ...	4	...	...	...
Skin Diseases ...	38	...	...	...
Abscess ..	31	1	12·2	...
Ulcer .	18	...		
Boils ...	20	...		
Debility ...	229	69†	71·2‡	12·23‡
Injuries ...	69	2	12·2	...
Amputation of Arm (after Compound Fracture) ...	...	1	...	...
Ratio for all causes not specially calculated ...	...	...	28·0	2·13
	4,592	461	813·6	81·68

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* These deaths are entered under the heading "Childbirth and Abortion" in Table I; taken together, they, give a ratio of 3·13 per 1,000 of Strength.
† The deaths noted under "Debility" include the deaths from Anæmia.
‡ With Anæmia.

2. NATIVE TROOPS, 1870.

The regimental strengths upon which the actual death-rate for the year is calculated are taken as at 1st January. The difference between the strength of January and December is 228 only, the strength on the 1st January having been 44,731, and on the 31st December 44,503. The death-rates may, therefore, be calculated with approximate accuracy on the strength with which regiments commenced the year. The total deaths, absent and present, amount to 869, and this number, with a strength of 44,731, represents a loss of 19·43 per 1,000. The deaths of men present with their regiments amounted to 632, giving a ratio of 15·89 in relation to a strength of 39,783, the average present during the year.

NATIVE TROOPS, 1870.

I.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in the BENGAL PRESIDENCY during the Year 1870, *and the prevalence of the principal Diseases in each Month of the Year.*

(This Statement is for the Regular Native Army only, and for men present from month to month with their Regiments.—See introductory note.)

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS IN HOSPITAL.																		Died out of Hospital.
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.		
January ..	43,035	1,843	42·8	70	1·84	4	...	17	6		11	5	...	2	19	.	6	...	1	3	...	3		2
February ...	43,033	1,506	36·4	58	1·35	2	.	18	6	3	6	4			10	2	1		1	2	.	3		...
March .	43,052	1,442	33·5	54	1·25	4	.	8	8	..	5	4	1	..	13	.	6	...	...	2	...	2		1
April ..	39,630	1,290	32·0	44	1·11	10	3	4	4		1	1			8	1	1	1	..	3		1		3
May .	37,411	1,257	33·6	42	1·12	7	1	4	7	3	4	1		1	8	1	1	...	..	..		2		2
June ..	37,266	1,203	32·3	26	·70	2	...	5	5		2	...	.		1	..	5	1	...	1	1	...		3
July ..	37,375	1,323	35·4	19	·51	...		3	1	2	3	1			3	1		...	...	...	.	4		1
August ...	37,301	1,663	44·6	31	·83	1	1	4	3	...	3	2	1	3	3	.	4	1	...	...	..	4		1
September	37,388	2,345	62·7	25	·67	...		1	2	1	7	1	1		2	2	1		1	3	1	1		1
October ...	38,169	2,792	73·1	54	1·41	...	..	15	6		9	6	1		4	...	4		2	1	1	4		1
November ...	41,571	2,581	62·1	79	1·90	...	...	25	6	...	10	6			16		2	1	1	1	...	7		1
December ..	42,168	2,141	50·8	124	2·87	...	..	15	9	...	16	11	1	4	41	1	1	3	1	3	5	8		2
						30	5	122	63	9	77	42	5	10	128	8	35	7	7	19	8	39		18
						Died per 1,000 of the Average Strength.																		
For the year ..	39,783	1,787	44·9	632	15·89	·75	·13	4·65		·23	1·94	1·06	·13	·25	3·22	·20	·88	·17	·17	·48	·20	·98		·45

Absent Deaths, 237. Ratio of 869 Deaths, 19·43 per 1,000 of the Total Regimental Strength.

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera .	4	4	7	14	17	3	1	1	...	...	...	...	51	1·3	58·82
Smallpox ...	5	3	17	19	7	2	1	1	...	..	1	3	59	1·5	8·47
Fever, Intermittent .	1,590	1,048	1,335	1,355	2,084	1,562	1,985	3,685	5,030	5,656	5,461	2,006	32,887	826·7	·37
Fever, Remittent and Continued .	26	38	52	31	62	20	22	38	27	58	44	30	443	11·2	14·22
Apoplexy ..		3	...	..	10	...	2	..	1	...	1	1	18	·5	50·00
Dysentery ...	358	218	226	182	240	181	221	377	296	315	431	401	3,176	87·4	2·10
Diarrhœa	158	127	160	137	181	150	158	221	128	150	251	192	2,022	50·8	
Hepatitis ...	7	5	7	5	6	4	5	6	10	4	6	8	73	1·8	6·85
Spleen Disease .	41	20	33	22	45	21	37	54	245	171	162	103	966	24·3	1·04
Respiratory Diseases ..	236	199	205	122	107	69	67	115	98	127	264	328	1,935	48·6	6·62
Phthisis Pulmonalis ...	9	7	12	6	7	8	8	9	7	6	8	9	96	2·4	36·46
Dropsy ..	2	...	1	...	1	1	2	1	...	3	5	4	20	·5	35·00
Scurvy ..	19	11	7	6	3	5	8	6	10	10	10	11	106	2·7	6·60
Rheumatism .	257	206	221	146	158	126	132	191	123	147	273	209	2,189	55·0	·43
Venereal Diseases .	122	117	176	119	154	103	96	133	95	75	96	97	1,383	34·8	
Eye Diseases ..	47	36	81	70	108	73	94	140	143	93	96	42	1,031	25·9	
Abscess and Ulcer	319	251	204	240	290	289	422	502	321	302	453	317	4,049	101·7	
Wounds and Accidents .	350	331	304	276	307	279	337	532	324	325	559	383	4,407	110·7	
All other Causes .	308	301	459	306	319	254	209	431	334	305	498	315	4,159	104·5	
	3,891	2,929	3,087	3,056	4,175	3,079	3,897	6,452	7,190	7,786	8,619	4,609	50,370		
	Admitted per 1,000 of the Average Strength in each Month.														
	90·4	68·1	85·6	77·1	111·6	82·6	104·3	173·0	192·3	204·0	207·3	109·3	1402·3		

NATIVE TROOPS, 1870.

II.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in BENGAL PROPER and in ASSAM during the Year 1870, *and the prevalence of the principal Diseases in each Month of the Year.*

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	7,284	342	47·1	16	...	4	...	3	...	..	1	1	...	1	2	..	...	...	1	2	..	1	...
February ..	7,963	329	41·3	8	...	1	...	...	..	...	2	2	.	..	...	1	...	..	1		...	1	..
March ...	7,896	290	36·7	14	...	4	.	..	..	.	2	1	...	...	1	.	4	...	...	1	...	1	...
April ...	7,457	266	35·7	10	...	5		1	.	..	1	1	...	...	...	..	1	...	...	.	..	..	1
May .	6,958	257	36·9	14	...	6	...	...	1	..	2	...			2	1	...	...	..		...	1	1
June ...	6,882	278	40·4	8	...	2	.	...	1	...	...	...	.	...	...	..	2	1	...	...	...	..	2
July ...	6,875	336	48·9	3	...	...	..	...	1	...	1	...		..	...		...	...	...	..	...	1	...
August ...	6,943	392	56·5	8	...	.	...	1	2	.	2	1	..	...	...		.	1	...	..	...	1	...
September ...	6,930	389	56·1	6	..	..	..	.	1	..	2	1		...	...	...	1	...	.	.	.	...	1
October ...	7,068	367	51·9	12	...	..	...	1	2	..	2	2	...	..	...		2	...	2	...	1	...	...
November ...	7,321	363	49·6	3	..	.	...	.	...	.	.	1	.	...	...	.	1		1	..		...	...
December ...	7,423	346	46·5	11	...		..	3	.	...	2	1	...	.	2		...	1	1	...	...	1	...
						22	.	9	8	...	17	11	...	1	7	2	11	3	6	3	1	7	5
						Died per 1,000 of the Average Strength.																	
For the year ..	7,248	330	45·5	113	15·59	3·03	...	2·34			2·34	1·52	...	·14	·97	·28	1·52	·41	·83	·41	·14	·97	·69

Absent Deaths, 48. Ratio of 161 Deaths, 20·14 per 1,000 of the Total Regimental Strength.

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month. Jan.	Feb.	March	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
Cholera	4	3	5	8	14	3	1	...	...	...	...	...	38	5·2	57·80
Smallpox	3	...	5	1	...	..	..	...	...	..		.	9	1·2	...
Fever, Intermittent	294	221	240	204	313	372	509	821	490	429	502	317	4,772	658·4	·19
Fever, Remittent and Continued ...	4	4	11	4	6	6	5	10	5	10	2	3	70	9·7	11·43
Apoplexy	..	...	...	...	...	...	...	...	..	...	1	...	1	·1	...
Dysentery	126	100	84	55	85	68	71	81	63	69	82	60	944	130·2	1·91
Diarrhœa	60	53	51	32	60	41	36	39	40	36	42	34	524	72·3	
Hepatitis	1	2	2	1	3	...	2	2	2	1	1	3	20	2·8	...
Spleen Disease ...	14	13	6	8	13	7	18	19	14	11	9	3	135	18·6	·74
Respiratory Diseases ..	47	23	32	25	32	14	21	67	54	49	71	42	477	65·8	1·47
Phthisis Pulmonalis .	2	1	5	4	1	2	...	...	3	5	2	1	26	3·6	42·31
Dropsy ..	2	...	...	...	1	1	2	...	...	...	2	2	10	1·4	30·00
Scurvy ...	9	5	2	2	1	...	3	1	7	7	4	6	47	6·5	12·77
Rheumatism ...	37	48	44	21	41	20	27	42	34	35	66	38	462	63·8	·37
Venereal Diseases ...	17	10	33	20	26	20	17	36	16	12	15	16	217	34·1	
Eye Diseases ...	5	7	10	4	12	17	13	13	23	8	14	5	131	18·1	
Abscess and Ulcer ...	61	45	55	51	57	48	43	65	39	44	65	44	617	85·1	
Wounds and Accidents ..	73	52	60	64	72	30	77	90	63	71	106	91	858	118·4	
All other Causes ...	80	95	160	102	105	70	82	108	104	85	121	82	1,194	164·7	
	839	691	814	606	842	728	987	1,394	957	872	1,105	747	10,582		
	Admitted per 1,000 of the Average Strength in each Month.														
	115·5	86·8	103·1	81·3	121·0	105·8	143·6	200·8	138·1	123·4	150·9	100·6	1460·0		

NATIVE TROOPS, 1870.

III.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in the DINAPORE, BENARES, OUDE and CAWNPORE DISTRICTS during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	6,319	193	30·5	6	...	...	...	1	...	...	...	...	..	1	2	...	1	...	...	1	...	...	...
February ...	7,063	259	36·7	8	...	1	...	1	2	...	4	..	...	...	...	..	...	...	.	..	..	...	...
March ...	7,319	273	37·3	8	...	...	...	3	2	...	2	..	...	...	1	..	..	.	.	..	..	...	...
April ...	6,665	199	29·9	5	...	4	...	..	.	...	..	...	...	...	..	..	..	.	..	...	...	1	.
May ..	6,617	176	26·6	3	...	..	.	...	2	1	.	...	..	..	...	...	..	...	...	...	...	...	.
June ...	6,577	156	23·7	1	...	..	.	1	..	...	..	..		..	..	...			...	..		..	..
July ...	6,576	189	28·7	2	...			...	...	..	..		...		...	...	..	.	...	..	.	2	..
August ...	6,510	219	33·6	4	...	1		1	..	.	...	.		1	.	...		.	...	..	.	1	...
September ...	6,611	264	40·0	4	...		.	..	...		1	..	1	...	.	...	.	...	...	1	...	1	...
October ...	6,668	421	63·1	10	...	...	..	2		..	3	1	1		1	..	..	...	...	.	...	2	.
November ...	6,977	389	55·7	10	...	..		3	1		2	2			2			...	...	..	...	..	...
December ...	7,001	330	47·1	13	...	...	...	1	1	...		1	1	1	4	...	1	1	...	...	1	1	...
						6		13	8	1	12	4	3	3	10		2	1	...	2	1	8	
						Died per 1,000 of the Average Strength.																	
For the year ...	6,742	256	38·0	74	10·98	·89	...	3·12		·15	1·78	·59	·44	·44	1·48		·30	·15	...	·30	·15	1·19	...

Absent Deaths, 57.* Ratio of 131 Deaths, 17·14 per 1,000 of the Total Regimental Strength.

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month. Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
Cholera ...	...	1	...	5	...	...	...	1	...	...	...	..	7	1·0	85·71
Smallpox ..	1	3	9	3	1	...	..						17	2·5	...
Fever, Intermittent ...	107	152	105	147	187	121	228	307	503	1,120	843	308	4,278	634·5	·30
Fever, Remittent and Continued ...	5	4	6	4	6	1	2	1	...	6	5	2	42	6·2	19·05
Apoplexy ...	...	...	...	...	4	...	...	...	...	..	...	...	4	·6	25·00
Dysentery ..	15	52	40	33	28	17	20	54	45	59	77	54	503	74·6	1·98
Diarrhœa ...	8	27	30	29	38	23	24	43	15	16	32	19	304	45·1	
Hepatitis ...	4	...	3	2	1	...	1	...	1	1	3	...	16	2·4	18·75
Spleen Disease ...	1	4	7	1	9	1	3	11	8	7	8	8	68	10·1	4·41
Respiratory Diseases ...	24	11	23	12	18	4	10	14	11	24	35	24	210	31·2	4·76
Phthisis Pulmonalis ...	...	1	3	...	...	2	2	3	2	1	3	5	22	3·3	9·09
Dropsy ...	...	...	...	...	..	..	...	...	...	...	1	1	2	·3	50·00
Scurvy ...	2	1	1	1	...	1	...	1	1	...	1	3	12	1·8	...
Rheumatism ...	28	30	32	17	24	16	26	28	19	11	39	35	308	45·7	·37
Venereal Diseases ...	27	35	64	20	38	20	21	24	18	16	14	24	330	48·9	
Eye Diseases ...	7	9	26	15	32	14	26	28	22	18	17	8	222	32·9	
Abscess and Ulcer ...	56	38	56	47	70	56	90	88	63	51	59	66	743	110·2	
Wounds and Accidents ...	37	69	56	47	58	46	57	74	44	47	78	64	608	90·1	
All other Causes ..	27	56	86	42	56	43	55	82	56	52	68	57	680	100·9	
	349	484	637	431	570	365	571	819	808	1,435	1,293	678	8,436		
	Admitted per 1,000 of the Average Strength in each Month.														
	55·2	68·5	87·0	65·1	86·1	55·5	87·3	125·8	122·2	215·2	185·3	96·8	1251·3		

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* The Regiments of this Province which suffered chiefly, owed their sickness and mortality to the effects of the climate of Lower and Eastern Bengal.

NATIVE TROOPS, 1870.

IV.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in the MEERUT DISTRICT and in ROHILCUND during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																	Died out of Hospital.
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	
January ...	4,920	146	29·7	4	...	...	..	...	1	...	...	1	...	...	1	..	1	...	...	...	..	...	...
February ...	5,636	159	28·2	2	..	...	...	...	1	...	...	.	...	.	...	1	...	...	...	...	..	..	...
March ...	6,333	238	37·6	9	...	...		1	4		1	...			2	...	...	...	...	...	.	...	1
April ...	5,855	183	31·3	10	...	1	2	1	1	...	...	...	...		1	.	3	1	...	.	..	...	...
May ...	5,650	186	32·9	7	...	1	1	...	1	.	.	1	.	1	1	...	..	..	...	.	.	1	...
June ...	5,704	158	27·7	6	...	...	...	1	.	..	1	..	..	...	...		2	..	.	1	1	...	...
July ...	5,734	161	28·1	2	..	...	.	...	...	..	1	.			1	...	..	..	..	..		...	...
August ...	5,700	183	32·1	4	...	.	..	..	.	...	...		..	2	..		1	..	..	...	.	1	...
September ...	5,746	264	45·9	4	...	..	.	1			1	...		.	.	2	...	..	...	...	...	...	...
October ...	5,815	282	48·5	5	...	.	..	1	...	..	1	...	...	.	...	.	1	...	.	1	...	...	1
November ...	6,430	254	39·5	7	...	...	...	...	.		1	..			1	...	1	..	...	...	...	4	...
December ...	6,493	220	33·9	8	...	...	...	..	2	..	1	...	.	...	...	...	...	...	...	1	2	2	...
						2	3	5	10	.	7	2	.	3	7	3	9	1	...	3	3	8	2
						Died per 1,000 of the Average Strength.																	
For the year ...	5,835	203	34·8	68	11·65	·35	·51	2·57		...	1·20	·35	...	·51	1·20	·51	1·54	·17	...	·51	·51	1·37	·35

Absent Deaths, 43. Ratio of 111 Deaths, 16·61 per 1,000 of the Total Regimental Strength.*

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ..	...	...	1	1	3	...	...		...	...	...	...	5	·9	40·00
Smallpox ...	1	...	1	7	5	2	1	.	.	.	.	2	19	3·2	15·79
Fever, Intermittent ..	69	73	127	128	300	153	171	370	550	535	425	151	3,061	524·6	·16
Fever, Remittent and Continued ...	3	5	12	4	6	5	4	7	3	2	6	9	64	11·0	15·63
Apoplexy ...	...	...	...		...	...	...	...	...	...	...	...	...	...	...
Dysentery ...	8	9	15	11	17	15	20	24	27	33	42	24	245	42·0	2·13
Diarrhœa ...	7	3	14	11	18	22	8	9	6	5	15	8	126	21·6	
Hepatitis ...	...	...	1	2	1	..	2	2	3	1	..	4	16	2·7	...
Spleen Disease ...	6	...	11	3	4	...	8	7	13	16	12	1	81	13·9	3·70
Respiratory Diseases ...	15	18	11	20	19	11	7	6	5	14	21	30	207	35·5	3·38
Phthisis Pulmonalis ...	4	2	1	1	2	3	2	3	1	...	2	1	22	3·8	40·91
Dropsy ..	...	.	1	.	...	..	...	...	...	...	...	...	1	·2	...
Scurvy ...	.	...	...		.	...	...	..	..	...	..	...	...	...	...
Rheumatism ...	27	24	37	33	30	15	11	16	14	17	30	21	275	47·1	·83
Venereal Diseases ...	19	14	21	17	28	20	17	17	11	11	24	14	213	36·5	
Eye Diseases ...	4	1	11	10	15	6	13	19	13	12	7	6	117	20·0	
Abscess and Ulcer ...	30	31	29	19	[illegible]	23	40	53	43	38	60	48	451	77·3	
Wounds and Accidents .	26	50	73	40	54	40	44	75	34	46	72	50	604	103·5	
All other Causes ...	17	24	43	31	34	27	21	38	32	23	65	30	381	65·3	
	236	251	439	339	573	342	381	646	755	753	771	399	5,888		
	Admitted per 1,000 of the Average Strength in each Month.														
	48·0	45·1	69·3	57·9	101·4	60·0	66·4	113·1	131·4	129·5	119·9	61·5	1009·1		

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* See Note to Table XVI, Section 3.

NATIVE TROOPS, 1870.

V.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in the AGRA DISTRICT and in CENTRAL INDIA during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

(Several of the Stations of this area usually occupied by Regiments of the Bengal Army, were, in 1870, occupied by Madras Troops. The Statistics of the Madras Troops occupying Stations of the Bengal Presidency are given in Table XVII.)

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS IN HOSPITAL.																	Died out of Hospital.
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	
January	4,363	240	55·0	3	...	...	...	...	...	...	...	1	...	...	2	...	...	...	...	...	...	...	...
February ...	4,278	202	47·2	2	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...
March ..	4,183	174	41·6	3	...	...	...	1	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...
April ...	3,836	199	51·9	2	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
May ...	3,738	192	51·4	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
June ..	3,538	164	46·4	3	...	...		2	1	...		...	...	...	...	...	...	...	...	...		...	...
July ...	3,696	161	43·6	4	...	...	...	1	...	...	...	...	...	...	2	1	...	...	...	...	...	...	...
August ...	3,565	258	72·4	6	...	...	...	1	1	...	1	1	1	...	...	...	1	...	...	...	...	...	...
September .	3,506	342	97·5	5	...	...	...	...	1	1	1	...	...	...	1	...	...	...	1	...	...	...	...
October ...	3,557	344	96·7	4	...	...	...	2	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...
November ..	3,473	266	76·6	9	...	...	...	3	...	...	2	1	...	...	1	...	...	1	...	...	...	1	...
December ...	3,700	259	70·0	10	...	...	...	...	...	...	3	...	...	1	6	...	...	...	...	...	...	...	...
						...	...	13	4	1	7	5	1	1	12	1	3	1	1	...	...	1	1
						Died per 1,000 of the Average Strength.																	
For the year ...	3,786	233	61·5	52	13·74	...	..	4·49		·26	1·85	1·32	·26	·26	3·17	·26	·79	·27	·27	...	...	·27	·27

Absent Deaths, 23. Ratio of 75 Deaths, 15·43 per 1,000 of the Total Regimental Strength.

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	...	...	1	...	...	...	...	...	...	...	...	...	1	·3	...
Smallpox ...	...	...	2	5	...	...	...	...	...	...	...	...	7	1·8	...
Fever, Intermittent ...	241	141	288	442	525	214	248	590	669	750	714	368	5,190	1370·8	·25
Fever, Remittent and Continued .	1	2	3	1	6	...	1	1	1	2	...	...	18	4·7	22·22
Apoplexy ..	...	...	...	...	2	..	...	...	1	..	...	...	3	·8	33·33
Dysentery ...	10	13	13	20	16	16	30	70	40	31	21	14	294	77·7	} 2·37
Diarrhœa ...	13	5	16	13	18	19	22	51	13	11	18	14	213	56·3	
Hepatitis ...	...	...	...	...	...	...	...	1	1	...	...	...	2	·5	...
Spleen Disease ..	2	2	1	1	4	...	1	3	1	2	4	2	23	6·1	4·35
Respiratory Diseases ...	10	15	13	8	5	8	4	6	5	10	15	22	121	32·0	9·92
Phthisis Pulmonalis ...	..	1	...	...	...	...	1	1	1	...	...	...	4	1·1	75·00
Dropsy ...	...	...	...	...	...	...	...	...	...	1	...	...	1	·3	...
Scurvy ...	3	3	1	2	...	1	...	2	1	1	...	...	14	3·7	7·14
Rheumatism ...	43	34	32	18	15	19	21	37	22	25	41	31	338	89·3	} ·08
Venereal Diseases ...	18	17	19	15	21	26	12	23	14	10	9	14	198	52·3	
Eye Diseases ...	7	5	13	12	8	3	9	28	21	16	11	5	138	36·4	
Abscess and Ulcer ...	50	38	37	17	29	44	53	81	53	58	60	39	559	147·6	
Wounds and Accidents ...	95	62	66	35	32	30	52	156	77	70	86	68	829	219·0	
All other Causes ...	53	34	34	32	25	29	32	60	48	30	29	24	439	115·9	
	546	372	539	621	706	409	486	1,119	968	1,017	1,008	601	8,392		
	Admitted per 1,000 of the Average Strength in each Month.														
	125·1	87·0	128·9	161·9	188·9	115·6	131·5	313·9	276·1	285·9	290·2	162·4	2216·6		

NATIVE TROOPS, 1870.

VI.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving the PUNJAB during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																	
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	16,918	769	45·5	44	...	...	...	13	5	...	8	1	...	...	11	...	4	...	..	...	...	1	1
February ..	17,590	612	34·8	37	...	...	...	15	3	3	...	1	..	...	10	...	1	...	...	2	...	2	...
March ...	17,115	464	27·1	20	...	...	...	3	2	..	...	2	1	...	9	..	1	...	..	1	...	1	...
April ...	15,615	439	28·1	17	...	...	1	...	3	.	...	...	...	...	7	1	...	...	...	3	...	...	2
May ...	14,448	446	30·9	17	...	...	...	4	3	2	2	...	...	...	5	..	1	...	...	...	...	...	...
June ..	14,380	447	31·1	8	...	...	...	1	3	..	1	...	...	...	1	...	1	...	...	...	...	...	1
July ...	14,494	476	32·9	8	...	...	...	2	...	2	1	1	...	...	...	..	...	...	...	...	...	1	1
August .	14,574	611	41·9	9	...	...	1	1	...	...	...	...	..	...	3	...	2	...	...	...	...	1	1
September ...	14,595	1,096	75·1	6	...	...	...	..	...	...	2	...	...	..	1	...	...	...	...	2	1	...	...
October ..	14,907	1,366	91·1	23	...	...	...	9	3	...	3	3	..	.	3	.	...	...	...	...	...	2	...
November ...	16,545	1,230	74·3	47	...	...	...	21	4	...	5	2	..	...	11	...	...	...	...	1	...	2	1
December ...	16,640	928	55·8	69	...	...	...	10	6	...	8	5	..	2	29	1	...	1	...	2	2	1	2
						...	2	79	32	7	30	15	1	2	90	2	10	1	...	11	3	11	9
						Died per 1,000 of the Average Strength.																	
For the year ...	15,660	740	47·2	305	19·48	..	·13	7·09		·45	1·92	·96	·06	·13	5·75	·13	·64	·06	...	·70	·19	·70	·57

Absent Deaths, 86. Ratio of 391 Deaths, 22·27 per 1,000 of the Total Regimental Strength.

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	...	...	...	...	..	...	...	..	...	..	...	...	...	...	...
Smallpox ...	...	...	...	3	1	...	...	1	...	...	1	1	7	·5	28·57
Fever, Intermittent ...	759	458	485	434	750	702	769	1,537	2,818	2,819	2,828	945	15,304	977·3	·52
Fever, Remittent and Continued ...	12	18	20	20	38	8	10	19	18	38	23	16	240	15·3	13·33
Apoplexy ...	...	3	...	...	4	...	2	...	..	...	..	1	10	·6	70·00
Dysentery ...	108	44	74	63	94	65	71	148	121	152	190	121	1,251	79·9	2·23
Diarrhœa ...	38	37	46	45	47	45	68	79	54	91	141	80	771	49·2	
Hepatitis ...	2	3	1	...	1	4	...	1	3	1	2	1	19	1·2	5·26
Spleen Disease ...	16	10	8	9	15	13	7	14	209	135	128	89	653	41·7	·31
Respiratory Diseases ...	127	130	96	57	33	32	25	22	21	30	117	201	891	56·9	10·10
Phthisis Pulmonalis ...	3	2	3	1	4	1	3	2	...	...	1	2	22	1·4	45·45
Dropsy ...	...	...	...	...	...	...	...	1	...	2	2	1	6	·4	16·67
Scurvy ...	2	2	3	1	2	3	5	2	1	2	1	2	26	1·7	...
Rheumatism ...	106	70	76	56	48	47	47	68	34	56	87	77	772	49·3	
Venereal Diseases ...	30	32	38	38	41	17	29	33	36	23	30	22	369	23·6	
Eye Diseases ...	16	14	21	29	41	32	33	61	64	39	37	18	405	25·8	
Abscess and Ulcer ...	135	96	114	104	115	98	187	215	123	106	188	142	1,623	103·6	
Wounds and Accidents...	92	105	130	89	151	83	107	137	106	91	150	107	1,348	86·1	
All other Causes ...	111	92	136	95	99	85	106	134	94	114	213	147	1,426	91·1	
	1,557	1,116	1,251	1,044	1,484	1,235	1,469	2,474	3,703	3,699	4,139	1,973	25,143		
	Admitted per 1,000 of the Average Strength in each Month.														
	92·0	63·4	73·1	66·9	102·7	85·8	101·4	169·7	253·7	248·1	250·2	118·6	1605·6		

NATIVE TROOPS, 1870.

VII.

COMPARATIVE STATEMENT *of the* **RATIOS** *of* **SICKNESS** *and* **MORTALITY** *among the* **NATIVE TROOPS** *serving in the various* **PROVINCES** *of the* **BENGAL PRESIDENCY** *for the Year* 1870.

(This Statement is for men of the Regular Army only, and for the Strength represented in Tables I to VI.)

DISEASES.	BENGAL PROPER AND ASSAM.			GANGETIC PROVINCES.			ROHILCUND AND MEERUT.			AGRA AND CENTRAL INDIA.			PUNJAB.			BENGAL PRESIDENCY.*		
	Average Strength ... 7,248 Daily Sick per 1,000 ... 45·5 Admission-rate per 1,000 ... 1460·0 Death-rate per 1,000— A. Cholera ... [illegible] B. All Causes ... [illegible] C. Including Absent Deaths ... [illegible]			Average Strength ... 6,742 Daily Sick per 1,000 ... 38·0 Admission-rate per 1,000 ... 1251·3 Death-rate per 1,000— A. Cholera ... [illegible] B. All Causes ... [illegible] C. Including Absent Deaths ... [illegible]			Average Strength ... 5,535 Daily Sick per 1,000 ... 34·8 Admission-rate per 1,000 ... 1009·1 Death-rate per 1,000— A. Cholera ... [illegible] B. All Causes ... [illegible] C. Including Absent Deaths ... [illegible]			Average Strength ... 3,786 Daily Sick per 1,000 ... 61·5 Admission-rate per 1,000 ... 2216·6 Death-rate per 1,000— A. Cholera ... [illegible] B. All Causes ... [illegible] C. Including Absent Deaths ... [illegible]			Average Strength ... 15,660 Daily Sick per 1,000 ... 47·2 Admission-rate per 1,000 ... 1605·6 Death-rate per 1,000— A. Cholera ... [illegible] B. All Causes ... [illegible] C. Including Absent Deaths ... [illegible]			Average Strength ... 39,783 Daily Sick per 1,000 ... 44·9 Admission-rate per 1,000 1492·3 Death-rate per 1,000— A. Cholera ... ·75 B. All Causes ... [illegible] C. Including Absent Deaths ... [illegible]		
	Admitted per 1,000.	Died per hundred treated.	Died per 1,000.	Admitted per 1,000.	Died per hundred treated.	Died per 1,000.	Admitted per 1,000.	Died per hundred treated.	Died per 1,000.	Admitted per 1,000.	Died per hundred treated.	Died per 1,000.	Admitted per 1,000.	Died per hundred treated.	Died per 1,000.	Admitted per 1,000.	Died per hundred treated.	Died per 1,000.
Cholera	5·2	57·99	[illegible]	1·0	55·71	[illegible]	·9	40·00	[illegible]	·3	...		...	...		1·3	58·52	·75
Smallpox	1·2	...		2·5	...		3·2	15·79	[illegible]	1·8	.		·5	28·57	[illegible]	1·5	8·47	·13
Fever, Intermittent ..	658·4	·19	[illegible]	634·5	·30	[illegible]	524·6	[illegible]	[illegible]	1370·8	·25	[illegible]	977·3	·33	[illegible]	826·7	·37	[illegible]
Fever, Remittent and Continued ...	9·7	11·43		6·2	19·05		11·0	15·63		4·7	22·22		15·3	13·33		11·2	14·22	
Apoplexy	·1	...		·6	25·00	[illegible]	...	...		·8	33·33	[illegible]	·6	70·00	[illegible]	·5	50·00	·23
Dysentery	130·2	1·91	[illegible]	74·6	1·98	[illegible]	42·0	2·43	[illegible]	77·7	2·37	[illegible]	79·9	2·23	[illegible]	87·4	2·16	[illegible]
Diarrhœa	72·3		[illegible]	45·1		[illegible]	21·6		[illegible]	56·3		[illegible]	49·2		[illegible]	50·8		[illegible]
Hepatitis ...	2·8	...		2·4	18·75	[illegible]	2·7			·5	..	[illegible]	1·2	5·26	[illegible]	1·8	6·85	·13
Spleen Disease ...	18·6	·74	[illegible]	10·1	4·41	[illegible]	13·9	3·70	[illegible]	6·1	4·35	[illegible]	41·7	·31	[illegible]	24·3	1·04	[illegible]
Respiratory Diseases ...	65·5	1·47	[illegible]	31·2	4·76	[illegible]	35·5	3·98	[illegible]	32·0	9·92	[illegible]	56·9	10·10	[illegible]	48·8	6·62	[illegible]
Phthisis Pulmonalis ..	3·6	42·31	[illegible]	3·3	9·09	[illegible]	3·8	40·91	[illegible]	1·1	75·00	[illegible]	1·4	45·45	[illegible]	2·4	36·46	[illegible]
Dropsy	1·4	30·00	[illegible]	·3	50·00	[illegible]	·2	.	[illegible]	·3	.	[illegible]	·4	16·67	[illegible]	·5	35·00	[illegible]
Scurvy	6·5	12·77	[illegible]	1·8	...		...	.		3·7	7·14	[illegible]	1·7	...		2·7	6·60	·17
Rheumatism ...	63·8	·37	[illegible]	45·7	·37	[illegible]	47·1	·53	[illegible]	59·3	·09	[illegible]	49·3	·45	[illegible]	55·0	·43	[illegible]
Venereal Diseases ...	34·1			48·9			36·5			52·3			23·6			34·8		
Eye Diseases ...	15·1			32·9			20·0			36·4			25·8			25·9		
Abscess and Ulcer ...	85·1			110·2			77·3			147·6			103·6			101·7		
Wounds and Accidents	118·4			99·1			103·5			219·0			80·1			110·7		
All other Causes ...	164·7			100·9			65·3			115·9			91·1			104·5		
Died out of Hospital ..	...	...	[illegible]	...	...		...	...	[illegible]	...	...	[illegible]	...	...	[illegible]	...	..	[illegible]
	1460·0	...	[illegible]	1251·3	...	[illegible]	1009·1	...	[illegible]	2216·6	...	[illegible]	1605·6	...	[illegible]	1492·3	...	[illegible]

* See note to Table III. † See note to Table IV.

NATIVE TROOPS, 1870.

VIII.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS, composing the CENTRAL INDIA IRREGULAR FORCE, during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																	Died out of Hospital.
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	
January ...	4,216	156	37·0	3	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	1	...	...
February ...	4,235	130	30·7	2	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1
March ...	4,032	128	31·7	4	...	...	...	2	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...
April ...	3,910	114	29 2	3	...	...	...	2	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
May ...	3,911	117	29·9	9	...	...	1	5	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...
June ...	4,026	108	26·8	5	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	2	1
July ...	4,124	118	28·6	2	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...
August ...	4,126	148	35·9	2	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...
September ...	4,078	171	41·9	5	...	...	...	1	1	...	1	...	...	...	1	...	...	...	...	...	...	1	...
October ..	4,014	217	54·1	2	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
November .	3,994	187	46·8	5	...	...	...	2	1	...	...	...	1	...	...	...	...	...	...	...	...	1	...
December ...	3,978	185	46·5	2	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
						...	1	15	5	...	3	1	1	...	5	1	...	...	..	1	4	4	3
						Died per 1,000 of the Average Strength.																	
For the year ...	4,054	148	36·5	44	10·85	...	·25	4·03		...	·74	·25	·25	...	1·23	·25	...	...	...	·25	·98	·98	·74

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Smallpox ...	1	...	...	1	...	...	...	...	...	...	...	...	2	·5	...
Fever, Intermittent ...	147	101	111	156	159	90	145	257	351	404	352	192	2,555	630·2	·59
Fever, Remittent and Continued ...	2	1	1	2	5	3	1	3	5	2	3	5	33	8·1	15·15
Apoplexy ...	...	...	...	...	..	1	...	...	...	...	...	...	1	·3	...
Dysentery ...	16	5	14	16	12	9	16	32	19	11	20	8	178	43·9	1·53
Diarrhœa ...	9	6	5	14	10	4	13	11	4	2	2	4	84	20·7	
Hepatitis ...	..	...	1	2	1	...	...	...	...	1	...	1	6	1·5	16·67
Spleen Disease ...	2	...	...	1	1	...	1	2	1	2	4	3	17	4·2	...
Respiratory Diseases ...	12	24	16	8	7	7	7	9	6	3	12	14	125	30·8	4·00
Phthisis Pulmonalis ...	...	...	1	...	...	...	...	...	1	...	...	...	2	·5	...
Dropsy ..	...	...	...	...	...	...	1	...	1	...	...	...	2	·5	...
Scurvy ...	...	...	...	...	...	...	...	...	...	1	...	...	1	·3	...
Rheumatism ...	22	17	9	6	10	20	12	19	17	11	15	15	173	42·7	·61
Venereal Diseases ...	16	24	20	15	22	15	13	12	8	13	8	12	178	43·9	
Eye Diseases ...	8	5	18	11	12	16	19	33	23	12	19	14	190	46·9	
Abscess and Ulcer ...	30	36	24	15	17	23	20	30	23	22	24	31	313	77·2	
Wounds and Accidents ...	45	27	28	23	25	15	22	35	30	16	42	67	375	92·5	
All other Causes ...	20	10	32	26	46	29	43	50	28	45	38	18	401	98·9	
	318	265	280	295	326	232	313	502	517	635	539	384	4,636		
	Admitted per 1,000 of the Average Strength in each Month.														
	82·5	62·6	69·5	75·4	83·4	57·6	75·9	121·7	126·8	158·2	135·0	96·5	1143·6		

The Total Strength of the Corps of the Central India Force was approximately 4,918, and out of this strength the deaths were 52, which gives a ratio of 10·58 per 1,00

The Gain and Loss Statement for the year is as under—

Strength borne on the Rolls on 1st January 1870	4,917
Additions received during the year	315
TOTAL ...	5,232
Deaths at Head-quarters 27, on Detachment 17, on Furlough 8; Invalided for Discharge 65; otherwise Discharged 197	314
Remaining on the Rolls of the Regiments on 31st December	4,918

NATIVE TROOPS, 1870.

IX.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS, composing the PUNJAB IRREGULAR FORCE, during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths in Hospital.																	
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	11,109	680	61·2	19	...	...	...	3	2	2	1	1	...	...	10	..	...	...	..	...	...	...	...
February ...	11,058	540	48·8	24	...	...	1	...	2	...	2	...	...	1	17	...	...	...	...	1	...	...	...
March ...	11,178	451	40·3	13	...	...	...	1	3	1	1	...	...	1	3	...	1	...	...	1	1	...	...
April ...	10,660	382	35·9	12	...	...	...	1	1	1	...	...	..	...	3	...	2	...	...	...	...	1	3
May ...	10,148	434	42·8	9	...	...	...	3	2	2	...	...	...	...	...	1	...	...	...	...	...	1	...
June ...	9,939	399	40·1	11	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	1	...	2	6
July ...	9,653	400	41·4	11	...	...	...	...	1	3	2	...	...	1	...	...	1	...	...	...	...	2	1
August ...	9,596	465	48·5	8	...	...	...	2	2	...	1	...	...	...	1	...	...	...	...	...	...	1	1
September ...	9,712	807	83·1	12	...	...	...	2	3	...	2	...	...	1	1	...	...	...	...	1	...	2	...
October ...	9,880	1,053	106·5	5	...	...	...	3	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...
November .	10,386	1,048	100·9	13	...	...	..	5	3	...	...	...	...	...	5	...	...	...	...	...	...	...	...
December ...	11,406	829	72·7	27		...	...	2	5	1	2	1	...	...	12	...	1	...	...	1	...	2	...
						...	1	23	24	10	11	2	1	4	52	1	5	...	1	5	1	12	11
						Died per 1,000 of the Average Strength.																	
For the year ...	10,394	624	60·0	164	15·78	...	·10	4·52		·96	1·06	·19	·10	·38	5·00	·10	·48	...	·10	·48	·10	1·15	1·06

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Smallpox ..	...	1	...	...	.	...	.	...	...	..	...	...	1	·1	...
Fever, Intermittent ..	641	397	435	486	1,004	592	558	1,060	2,235	2,814	2,595	904	13,721	1320·1	·17
Fever, Remittent and Continued .	10	8	10	8	10	4	6	6	8	9	12	18	109	10·5	22·02
Apoplexy ..	1	2	2	...	2	...	10	1	...	...	...	3	21	2·0	47·62
Dysentery	62	27	39	43	93	70	56	110	124	101	164	83	972	93·5	·74
Diarrhœa .	55	36	69	62	117	53	51	66	61	67	63	79	779	75·0	
Hepatitis ..	2	...	4	3	...	5	1	4	2	1	1	...	23	2·2	4·35
Spleen Disease ..	12	7	10	6	8	11	10	5	9	12	13	12	115	11·0	3·48
Respiratory Diseases ...	117	108	88	55	32	23	24	15	16	12	59	146	695	66·9	7·48
Phthisis Pulmonalis ...	1	1	4	2	...	1	1	...	...	1	...	2	13	1·3	38·46
Dropsy ..	..	...	...	...	...	1	...	...	...	...	1	2	4	·4	..
Scurvy ...	2	4	5	3	3	4	1	3	...	2	5	2	34	3·3	2·94
Rheumatism ..	91	68	78	43	56	41	35	39	27	37	70	74	659	63·4	·35
Venereal Diseases ...	15	18	11	19	13	18	12	23	19	16	26	17	207	19·9	
Eye Diseases ...	11	14	23	17	30	15	38	53	38	31	27	14	311	29·9	
Abscess and Ulcer ..	131	99	117	86	126	100	103	214	106	95	127	134	1,498	144·1	
Wounds and Accidents...	93	99	136	113	137	113	112	133	96	92	125	119	1,368	131·6	
All other Causes ...	136	113	135	122	140	84	97	126	81	68	95	104	1,308	125·8	
	1,380	1,002	1,157	1,068	1,780	1,144	1,175	1,858	2,822	3,366	3,383	1,713	21,838		
	Admitted per 1,000 of the Average Strength in each Month.														
	124·2	90·6	103·5	100·2	175·4	115·1	121·7	193·6	2·906	339·5	325·7	150·2	2101·0		

Calculated on a Strength of 12,200, which approximately represents the Total Strength, absent as well as present, the Death-rate of the year is 18·85 per 1,000, the equivalent of 230 deaths.

The Gain and Loss Statement for the Frontier Force for the year was as under—

Strength borne on the Regimental Rolls on 1st January 1870	12,152
Additions received during the year	1,635
Total ...	13,787
Deaths at Head-quarters and in Detachments 164; died while on Furlough and Sick Leave 60; Invalided for Discharge 270; Transfers given 25; Discharged otherwise 1,011	1,536
Remaining on the Rolls at the close of 1870	12,251

NATIVE TROOPS, 1870.

X.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS of the REGULAR ARMY and of the PUNJAB FRONTIER FORCE serving TRANS-INDUS during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

This Table contains the entire of the figures shown in the Statement for the Punjab Frontier Force, with the exception of the Statistics of Abbottabad, as well as the Statistics of the Regiments of the Regular Native Army serving beyond the Indus already incorporated in the General Statement for the Punjab.)

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS IN HOSPITAL. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January ...	14,375	848	59·0	28	1·95	...	...	5	3	2	4	1	...	...	11	...	1	...	...	...	...	...	1
February ...	14,300	613	42·9	25	1·75	...	1	...	3	...	1	...	...	1	17	...	...	...	...	2	...	...	...
March ...	14,591	523	35·9	18	1·23	...	...	2	2	1	1	1	...	1	7	...	1	...	...	1	1	...	...
April ...	13,514	438	32·4	15	1·11	...	...	1	2	1	...	...	...	...	3	...	2	...	...	1	...	1	4
May ...	12,932	448	34·7	15	1·16	...	...	3	4	3	1	...	...	...	2	1	...	...	...	...	...	1	...
June ...	12,747	440	34·5	12	·94	...	...	1	1	...	...	...	1	...	...	...	...	...	...	1	...	2	6
July ..	12,537	450	35·9	14	1·12	...	...	2	1	4	3	..	...	1	...	..	1	...	...	...	...	2	...
August ...	12,545	521	41·5	10	·80	...	1	3	2	...	1	...	...	...	1	...	1	...	...	...	...	...	1
September ...	12,560	1,118	89·0	10	·80	...	...	2	3	...	2	...	...	1	1	...	...	...	...	1	...	...	...
October ...	12,940	1,620	125·2	18	1·39	...	...	8	2	...	2	1	...	...	3	...	...	...	1	...	...	1	...
November ...	13,877	1,453	104·7	35	2·52	...	...	16	5	...	3	2	...	...	9	...	...	...	...	...	...	...	...
December ...	14,505	1,131	78·0	55	3·79	...	...	7	7	1	8	4	...	1	18	1	1	1	...	1	2	3	...
						...	2	50	35	12	26	9	1	5	72	2	7	1	1	7	3	10	12
						Died per 1,000 of the Average Strength.																	
For the year ...	13,452	800	59·5	255	18·96	...	·15	6·32		·90	1·93	·67	·07	·37	5·35	·15	·52	·07	·07	·52	·22	·75	·90

Absent Deaths 96. Ratio of 351 Deaths, 22·64 per 1,000 of the Total Regimental Strength.

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH. Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
Cholera ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Smallpox ...	...	1	...	1	...	...	...	1	...	...	...	...	3	·2	66·67
Fever, Intermittent ...	802	412	535	571	1,027	711	696	1,262	3,245	4,037	3,900	1,314	18,512	1376·2	·27
Fever, Remittent and Continued ...	16	16	20	14	30	7	13	19	24	42	21	26	248	18·4	14·11
Apoplexy ...	1	2	1	...	3	...	11	1	...	...	...	4	23	1·7	52·17
Dysentery ...	100	44	64	68	118	101	69	103	179	156	253	140	1,403	104·3	1·48
Diarrhœa ...	67	54	82	67	71	77	58	85	72	97	110	100	956	71·1	
Hepatitis ...	3	1	4	2	...	7	...	4	2	1	1	...	25	1·9	4·00
Spleen Disease ...	20	17	13	8	12	11	13	9	208	135	113	83	642	47·7	·78
Respiratory Diseases ...	150	102	108	60	36	30	20	12	21	24	97	214	883	65·6	8·15
Phthisis Pulmonalis ...	1	2	4	2	2	1	3	1	...	...	...	3	19	1·4	36·84
Dropsy ...	...	...	...	...	...	1	...	...	...	2	3	3	9	·7	11·11
Scurvy ...	2	5	5	2	1	2	1	2	...	1	4	3	28	2·1	3·57
Rheumatism ...	100	80	97	56	52	45	41	51	89	47	87	89	793	58·9	·35
Venereal Diseases ...	21	24	21	29	23	21	25	34	27	24	35	24	308	22·9	
Eye Diseases ...	14	17	26	18	36	26	40	66	51	40	37	15	386	28·7	
Abscess and Ulcer ..	166	118	126	98	130	113	195	235	125	96	148	157	1,707	126·9	
Wounds and Accidents ...	114	121	178	118	161	118	130	148	100	106	132	115	1,537	114·3	
All other Causes ...	171	136	146	131	137	88	109	153	86	93	169	166	1,585	117·8	
	1,757	1,152	1,440	1,245	1,829	1,359	1,432	2,246	4,185	4,901	5,110	2,465	29,127		
	Admitted per 1,000 of the Average Strength in each Month.														
	122·2	80·6	98·7	92·1	141·4	106·6	114·2	179·0	333·2	378·7	368·7	169·9	2165·3		

NATIVE TROOPS, 1870.

XI.

TABLE showing the DAILY AVERAGE SICK-RATE of each STATION in each Month.

STATIONS.	Average Strength for the period of observation.	Daily Sick per 1,000 of Average Strength in each Month.												Average Daily Sick per 1,000 of Strength during the period of observation.	Ratio for each Province.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
Fort William	638	39·1	58·6	50·8	35·0	48·3	60·0	75·0	76·8	90·0	81·8	66·4	58·9	61·1	45·5
Alipore	960	62·5	48·4	48·6	50·4	35·9	44·1	51·5	73·0	65·9	61·0	44·5	40·8	53·1	
Dum-Dum	475	49·6	28·2	28·3	21·7	31·7	33·0	28·6	40·9	48·1	60·4	57·9	41·4	37·0	
Barrackpore	675	65·4	39·7	42·7	49·8	45·7	40·6	45·4	63·7	48·1	44·2	60·3	66·7	51·9	
Berhampore	122	37·9	37·9	37·9	113·6	75·8	65·0	61·4	52·6	43·9	35·1	52·6	61·4	57·4	
Dacca	309	27·3	26·9	17·8	19·6	30·1	36·8	36·9	33·7	42·0	38·2	44·4	19·2	32·4	
Cachar and Sylhet	372	43·0	43·0	45·1	18·3	38·0	57·3	57·3	56·6	50·4	38·1	14·4	43·2	40·3	
Shillong	764	52·2	44·8	37·8	39·8	43·9	37·8	48·1	41·3	87·9	32·3	42·6	30·6	41·9	
Gowhatty	511	41·7	32·8	22·0	25·0	22·2	24·4	53 7	80·6	78·4	52·8	41·8	41·4	43·1	
Tezpore	189	35·9	41·9	53·9	32·8	32·8	36·5	41·2	44·8	52·4	26·0	62·2	57·1	42·3	
Nowgong	84	35·7	11·9	23·8	11·9	11·9	11·9	23·8	11·9	23·8	11·9	23·8	47·6	23·8	
Upper Assam	613	36·7	34·4	14·7	17·5	25·3	37·2	57·9	73·5	68·0	60·0	52·4	41·0	43·0	
Buxa	579	46·0	43·3	42·4	42·7	38·4	38·2	34·7	32·5	52·3	69·5	69·8	45·4	46·6	
Julpigoree, (11 months)	597	...	51·1	44·8	41·8	37·3	44·7	47·8	42·6	38·5	42·4	44·9	47·8	43·5	
Bhaugulpore	211	25·6	19·5	19·0	37·6	35·7	10·2	20·0	33·2	33·0	41·7	25·6	28·7	28·4	
Dinapore	334	33·7	19·7	24·9	22·0	24·9	25·0	30·6	32·0	30·2	30·7	39·7	24·9	26·9	38·0
Segowlie	306	26·2	20·4	23·3	17·5	20·4	32·5	28·9	39·9	51·1	45.8	45·8	28·0	29·4	
Benares	562	51·8	53·5	52·2	34·7	46·1	28·7	38·8	44·4	55·4	65·7	58·4	47·8	48·0	
Goruckpore	701	39·2	45·9	58·4	45·8	32·1	20·9	22·9	30·4	29·1	33·6	32·6	43·3	37·1	
Fyzabad	649	21·9	22·3	19·7	17·6	24·5	11·3	19·9	19·8	23·0	39·4	31·9	24·6	23·1	
Lucknow	1,728	17·0	47·2	50·1	35·7	24·4	19·2	23·4	22·7	31·3	43·0	53·6	45·5	35·3	
Seetapore	421	43·9	30·4	43·4	30·4	28·6	31·2	36·1	49·0	34·2	56·7	34·9	26·9	38·0	
Futtehghur	182	45·5	34·3	33·9	37·0	48·6	46·2	52·6	36·5	63.5	100·0	51·1	34·1	49·5	
Cawnpore	857	33·1	41·3	35·2	31·1	22·9	26·7	32·9	35·2	58·8	114·6	76·8	51·9	47·8	
Allahabad	824	20·4	19·4	13·9	22·0	19·3	26·8	29·5	50·5	49·6	113·7	96·5	96·1	47·3	
Nagode, (10 months)	131	38·7	38·7	19·2	12·7	26·8	36·0	52·2	60·9	84·5	41·0	...	..	38·2	
Shahjehanpore	359	16·2	16·2	8·1	16·2	16·4	19·6	16·7	14·2	17·3	17·0	16·9	8·5	16·7	34·8
Bareilly	916	19·3	21·3	20·7	28·0	31·2	33·9	32·9	30·0	38·5	40·0	37·8	31·8	30·6	
Moradabad	400	10·2	19·2	16·5	14·5	12·2	9·8	14·7	12·2	29·3	43·7	28·9	21·6	20·0	
Almorah	627	32·6	28·1	28·5	51·0	39·1	49·6	47·3	37·8	57·5	47·2	38·7	31·9	30·9	
Raneekhet Roads	661	21·6	24·4	30·2	19·9	24·4	28·7	37·3	40·5	36·0	23·5	34·5	32·1	28·8	
Chuckrata (11 months)	430	26·3	17·7	34·3	26·1	25·6	25·5	22·1	27·8	35·2	24·5	10·0	...	25·6	
Deyrah	670	36·7	42·3	40·8	29·7	40·5	27·9	28·0	37·3	52·5	44·4	38·8	31·2	37·3	
Roorkee	340	19·5	20·2	17·5	8·5	10·3	3·9	14·5	23·8	89·1	55·1	34·5	22·2	23·5	
Meerut	804	51·1	49·9	102·0	60·9	49·6	27·2	24·6	27·5	33·4	40·9	41·6	40·5	46·0	
Delhi	664	59·5	36·7	24·1	25·2	45·4	26·1	24·8	50·2	80·5	133·4	76·2	64·3	54·2	
Agra	1,058	43·0	41·2	37·8	36·5	24·0	27·3	22·4	35·2	42·0	30·5	43·4	61·7	37·8	61·5
Morar	1,433	67·1	55·4	54·7	74·9	82·9	69·9	65·4	107·2	125·7	126·4	115·3	89·1	83·7	
Jhansi	707	34·8	25·5	25·6	21·6	20·2	16·0	22·2	41·6	86·7	94·5	52·4	20·3	38·2	
Nowgong	273	66·7	75·7	48·0	59·9	53·6	55·8	63·0	93·1	148·8	161·4	85·4	84·1	84·3	
Lullut[illegible]	71	98·5	54·8	13·7	14·1	14·1	14·1	42·3	84·5	126·8	70·4	61·5	43·5	56·3	
Deolee	203	79·4	65·2	26·2	88·5	98·0	72·5	48·2	94·0	165·5	174·5	140·8	130·1	98·5	
Umballa	907	32·9	37·9	25·7	28·7	31·0	32·6	38·3	66·7	96·3	137·9	89·1	56·8	56·2	47·2
Simla (8 months)	176	...	...	...	10·9	22·7	17·0	17·0	34·0	34·0	24·8	34·3	...	28·4	
Loodianah	55	27·8	41·7	13·0	13·9	63·5	15·4	...	108·1	108·1	81·1	...	...	36·4	
Phillour	56	25·3	38·0	26·0	28·6	106·1	76·9	140·0	270·3	189·2	162·2	81·1	27·0	89·3	
Jullundur	548	29·4	40·5	28·9	24·1	28·4	39·0	50·2	82·2	174·8	118·7	98·2	110·6	62·0	
Ferozepore	648	44·7	26·4	20·3	18·4	28·5	29·7	28·3	32·0	32·5	36·2	32·6	21·9	29·3	
Mooltan	936	54·0	36·6	26·9	29·7	34·9	28·6	34·3	30·4	58·0	61·4	60·2	50·0	42·7	
Sealkote	1,013	25·0	19·6	18·6	21·8	24·0	20·6	21·4	26·5	45·7	46·2	26·0	14·2	25·7	
Dhurmsalla	642	23·7	21·6	21·8	25·9	19·4	27·7	27·7	29·3	27·6	25·8	24·2	23·6	24·9	
Bukloh	527	20·8	12·6	14·1	20·6	13·5	32·2	31·8	40·3	41·5	22·9	32·7	31·8	24·7	
Umritsur	146	20·5	20·7	41·1	48·3	13·8	13·8	13·7	20·5	75·3	68·5	47·9	54·8	34·2	
Meean Meer	1,371	70·9	64·3	50·1	56·3	77·8	57·6	43·9	41·8	49 7	58·5	105·6	98·9	65·7	
Jhelum	1,033	36·5	31·1	17·7	17·1	20·9	19·1	20·0	20·5	32·7	48·2	45·9	28·5	28·2	
Rawulpindee	997	62·9	57·6	57·6	43·2	27·0	28·1	33·7	36·4	63·8	56 5	52·4	52·5	48·1	
Tallagunge	509	9 5	13·4	16·3	25·7	30·6	28·4	25·6	39·2	30·9	27·6	53·8	60·1	29·5	
Attock	165	29·1	23·3	29·1	34·9	23·0	34·1	34·1	56·3	106·7	120·0	83·8	62·1	54·5	
Huzara (10 months)	660	32·0	24·3	14·1	24·6	27·0	34·3	43·2	64·2	84·3	67·9	...	...	39·4	
Murree (10 months)	80	34·5	17·2	34·5	50·6	60·0	40·0	60·0	50·0	60·0	40·0	..	..	50·0	
Nowshera	880	74·0	45·1	30·7	20·9	16·5	24·8	35·9	42·4	58 7	84·0	159·3	83·9	56·8	
Peshawur	3,664	45·8	28·4	25·5	25·9	28·0	31·5	31·9	42·0	124·8	180·6	95·5	82·1	61·9	
PUNJAB FRONTIER FORCE.															
Murdan	801	138·3	97·4	66·7	75·2	60·8	46·9	43·5	55·1	81·4	166·7	184·9	113·3	97·6	60·0
Abbottabad	1,486	49·1	48·6	39 5	34·7	65·4	60·2	63·8	90·8	116·5	112·5	86·5	53·4	67·3	
Kohat	2,442	73·0	52·6	40·4	35·3	38·5	32·4	30·3	37·8	84 9	101·6	96·7	74·6	58·1	
Bunnoo	1,760	57·9	48·6	40·8	33·3	36·0	44·4	40·1	48·3	67·7	68·3	70·7	63·3	52·8	
Dera Ghazee Khan	1,679	40·9	39·6	32·3	28·4	31·1	30·2	29·8	31·9	87·9	100 5	101 1	69·8	53·0	
Dera Ismael Khan	1,716	37·8	30·3	28·6	24·3	36·7	33·4	34·5	38·4	47·3	72·3	71·6	61·6	42·0	
Rajanpore	303	76·9	49·3	52·2	62·8	66·3	51·8	39·1	47·5	141·0	263·8	211·9	139·2	101·8	
CENTRAL INDIA FORCE.															
Augur	250	25·9	25·8	29·4	33·0	14·9	34·0	38·4	77·9	41·8	51·8	56·9	22·1	40·0	36·5
Goonah	331	16·3	13·7	12·3	7·0	6·8	10·1	6·5	8·5	8·5	10·7	11·5	82·0	15·1	
Sirdarpore	410	19·0	17·0	15·4	21·4	15·3	21·2	14·2	21·1	24·0	36·7	29·4	34·8	22·0	
Kherwarrah	600	45·3	21·2	34·5	31·1	33·5	27·6	31·3	36·0	47·3	63 5	50·1	42·7	39·4	
Erinpoorah	814	41·4	36·9	28·7	24·0	17·1	17·1	13·7	23·2	22·5	50·7	45·2	36·9	29·5	
Deolee	773	54·0	43·8	45·0	32·8	55·8	47·3	56·4	52·1	87·0	90·8	74·2	77·5	59·5	
Sehore	816	34·3	36·3	36·7	41·2	28·0	23·9	27·5	39·4	36·8	45·0	38·5	27·7	34·3	

NATIVE TROOPS, 1870.

XII.

TABLE showing the RATIO in which the CHIEF DISEASES have contributed to make up the ADMISSION-RATE of each STATION.

STATIONS.	Average Strength during the period of observation.	Admitted into Hospital per 1,000 of Average Strength.											Admitted per 1,000 of Strength during the period of observation.
		Cholera.	Fevers.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Ophthalmia.	Rheumatism.	Venereal Diseases.	Diseases of the Respiratory Organs.	All other Cause.	
Fort William	638	9·4	1075·2	155·2	111·9	8·1	12·5	22·0	120·7	31·4	137·9	647·9	2320·0
Alipore	960	8·3	951·0	331·3	133·3	...	12·5	15·6	57·3	35·4	68·8	502·1	2115·6
Dum-Dum	475	4·2	458·9	107·4	65·3	6·3	2·1	14·7	50·5	29·5	71·6	305·3	1115·8
Barrackpore	675	4·4	508·2	120·0	32·6	1·5	4·4	20·7	60·8	50·4	69·6	325·9	1198·5
Berhampore	132	8·2	1114·7	90·2	49·2	...	8·2	41·0	90·2	24·6	8·2	270·5	1705·0
Dacca	309	16·2	294·5	93·8	110·0	6·5	6·5	9·7	74·4	32·4	38·8	433·7	1110·5
Cachar and Sylhet	372	2·7	1020·9	59·8	32·3	5·4	...	34·9	102·1	43·0	61·8	284·9	1647·8
Shillong	764	1·3	273·6	55·0	34·0	7·9	70·8	18·3	48·4	43·2	60·4	308·9	939·8
Gowhatty	511	19·6	943·2	70·5	52·8	3·9	15·7	27·4	17·6	64·6	47·0	358·1	1620·4
Tezpore	189	...	1021·2	42·3	95·3	...	52·9	15·9	100·5	37·0	100·5	576·7	2042·3
Nowgong	84	...	202·4	35·7	23·8	11·9	11·9	...	59·5	23·8	11·9	131·0	511·9
Upper Assam	813	1·2	895·5	94·7	40·7	1·2	20·9	18·5	60·3	2·5	75·0	377·6	1594·1
Buxa	579	...	481·9	171·0	127·8	...	...	...	67·3	13·8	55·3	426·6	1343·7
Julpigoree (11 months)	597	...	239·5	98·8	58·6	...	6·7	10·1	48·6	11·7	25·1	130·7	629·8
Bhaugulpore	211	...	104·3	52·1	...	...	33·2	37·9	28·4	113·8	4·7	274·9	649·3
Dinapore	334	...	314·4	29·9	44·9	6·0	...	15·0	32·9	47·9	21·0	152·7	664·7
Segowlie	306	...	290·8	78·4	13·1	...	...	3·3	32·7	29·4	19·6	359·5	826·8
Benares	562	1·8	603·2	65·8	17·8	1·8	28·5	14·2	33·8	67·6	16·0	245·6	1096·1
Goruckpore	701	...	321·0	49·9	1·4	2·9	4·3	61·3	34·2	88·4	48·5	309·6	921·5
Fyzabad	649	3·1	406·9	55·5	23·1	...	4·6	20·3	38·5	35·4	24·7	181·6	802·9
Lucknow	1,728	1·7	589·1	90·3	78·7	2·3	20·3	42·2	53·2	32·4	28·4	327·0	1265·6
Seetapore	421	...	301·9	73·6	20·1	9·5	2·4	40·9	95·0	45·1	76·0	406·5	1260·0
Futtehghur	182	...	802·2	82·4	66·0	...	5·5	65·9	41·0	98·9	33·0	480·0	1698·8
Cawnpore	857	...	1190·2	33·8	52·5	1·2	5·8	28·0	29·3	65·3	24·5	485·6	1896·2
Allahabad	824	1·2	1006·1	144·4	64·3	1·2	4·9	15·8	54·6	96·4	34·0	267·0	1629·9
Nagode (10 months)	131	...	442·8	68·7	7·6	7·6	...	15·3	45·8	7·6	7·6	190·9	793·9
Shahjehanpore	359	2·8	312·0	47·4	...	...	...	13·9	16·7	22·3	8·3	97·5	520·9
Bareilly	916	...	280·0	27·9	1·1	1·1	3·3	28·4	38·2	40·4	21·8	310·1	753·3
Moradabad	400	2·5	360·0	20·0	5·0	...	...	5·0	10·0	27·5	10·0	102·5	542·5
Almorah	627	...	381·2	28·7	9·6	6·4	8·0	17·5	100·5	51·0	60·6	231·3	894·8
Raneekhet Roads	661	...	295·0	64·5	43·9	...	1·5	12·1	75·7	63·5	16·6	388·8	951·6
Chuckrata (11 months)	430	...	232·6	44·2	25·6	...	2·3	18·6	37·2	37·2	32·6	200·0	630·3
Deyrah	670	..	214·9	4·5	10·4	7·5	71·6	67·2	28·4	53·7	13·4	255·2	735·8
Roorkee	340	...	605·9	26·5	29·4	...	8·8	8·8	23·5	29·4	44·1	170·6	947·0
Meerut	804	2·5	804·7	84·6	24·9	5·0	14·9	9·9	60·0	18·7	80·6	302·2	1417·9
Delhi	664	1·5	1620·5	69·3	54·2	3·0	9·0	1·5	37·7	9·0	31·6	238·0	2075·3
Agra	1,058	...	662·6	34·0	42·5	1·0	1·9	28·4	69·9	75·6	37·8	313·8	1267·5
Morar	1,433	·7	2213·5	127·7	104·0	...	7·0	51·6	143·8	40·5	44·0	762·7	3525·5
Jhansi	707	...	508·6	24·0	15·6	...	...	25·4	7·1	36·8	8·5	76·4	702·4
Nowgong	273	...	1344·3	146·5	11·0	3·7	40·3	40·3	139·2	25·6	18·3	974·4	2743·6
Lullutpore	71	...	2211·2	28·2	...	...	...	14·1	56·3	14·1	14·1	366·2	2704·2
Deolee	203	...	1684·7	69·0	24·6	...	...	19·7	54·2	123·1	29·6	413·8	2418·7
Umballa	907	...	845·6	46·3	22·1	2·2	2·2	38·6	62·8	38·6	32·0	341·8	1432·2
Simla (8 months)	176	...	409·1	22·7	34·1	...	5·7	...	51·1	11·4	...	176·1	710·2
Jullundur	548	...	1162·4	56·6	5·5	1·8	29·2	21·9	20·1	27·4	54·7	299·2	1678·8
Ferozepore	648	...	425·9	35·5	23·2	1·5	20·1	38·6	80·2	92·4	78·7	420·0	1165·1
Mooltan	936	...	439·1	25·6	20·3	1·1	7·5	29·9	53·4	15·0	38·5	300·2	930·6
Sealkote	1,013	...	504·4	27·6	5·9	2·0	1·0	28·6	11·9	32·6	10·9	174·7	799·6
Dhurmsalla	642	...	638·6	20·3	10·9	3·1	15·6	32·7	52·9	17·1	12·5	177·6	981·3
Bukloh	527	...	242·9	3·8	9·5	...	7·6	5·7	51·2	5·7	15·1	316·9	658·4
Umritsur	146	..	630·1	164·4	102·7	...	34·3	13·7	34·3	54·8	47·9	315·1	1397·3
Meean Meer	1,371	..	862·2	101·4	48·1	...	37·2	27·7	60·6	25·5	132·0	352·3	1650·0
Jhelum	1,633	...	672·4	80·2	20·2	1·2	1·2	28·2	39·2	15·3	35·5	260·3	1153·7
Rawulpindee	907	...	991·0	77·2	87·3	1·0	7·0	19·1	69·2	18·1	67·2	300·9	1630·0
Tallagunge	509	...	707·2	51·1	15·7	...	2·0	33·4	41·3	5·9	49·1	337·9	1243·6
Attock	165	...	1230·3	103·0	109·1	...	...	12·1	60·6	...	12·1	278·8	1806·0
Huzara (10 months)	660	...	586·4	54·5	25·8	3·0	10·6	10·6	28·8	30·3	21·2	209·1	980·3
Murree (10 months)	80	...	837·5	162·5	525·0	...	...	25·0	12·5	...	62·5	562·5	2187·5
Nowshera	880	..	1663·6	177·3	20·5	2·3	10·2	18·2	47·7	14·8	36·4	282·9	2273·9
Peshawur	3,664	...	1607·5	114·3	99·1	·6	140·3	26·5	53·8	26·7	71·2	259·3	2399·3
PUNJAB FRONTIER FORCE.													
Murdan	891	...	977·6	46·0	76·3	11·2	12·3	60·6	55·0	38·2	103·2	477·0	1857·4
Abbottabad	1,486	...	1691·2	56·5	137·3	1·3	...	25·6	70·7	6·7	68·0	300·0	2357·3
Kohat	2,442	...	1506·6	90·5	80·3	1·2	12·7	23·4	65·9	18·8	56·9	390·4	2245·7
Bunnoo	1,760	...	1404·5	152·8	109·7	1·1	14·2	27·9	82·4	11·4	105·7	463·6	2373·3
Dera Ghazee Khan	1,079	..	1168·6	92·3	22·0	1·2	10·7	27·4	56·0	19·1	63·1	375·8	1836·2
Dera Ismael Khan	1,716	...	893·4	96·2	42·5	2·3	14·6	29·1	48·9	32·6	30·3	349·1	1539·0
Rajunpore	393	...	2244·3	91·6	20·4	...	12·7	43·3	48·3	22·9	48·3	709·9	3241·7
CENTRAL INDIA FORCE.													
Augur	250	...	504·0	52·0	4·0	8·0	12·0	20·0	44·0	36·0	12·0	260·0	952·0
Goonah	331	...	175·2	27·2	3·0	...	3·0	6·1	30·2	3·0	12·1	60·4	320·2
Sirdarpore	410	...	526·8	12·2	51·2	...	2·4	70·8	31·7	7·3	36·6	151·2	890·2
Kherwarrah	660	...	740·9	39·4	10·6	1·5	4·5	83·3	54·6	10·6	37·9	474·3	1457·6
Erinpoorah	814	...	320·6	8·6	13·5	...	2·5	46·7	16·0	92·1	4·9	180·0	685·5
Deolee	773	...	1002·6	44·0	14·2	...	5·2	34·9	50·5	81·5	42·7	426·9	1702·5
Sehore	816	...	812·5	102·0	39·2	3·7	3·7	41·7	62·5	24·5	50·2	196·1	1337·0

NATIVE TROOPS, 1870.

XIII.*

TABLE showing the MORTALITY in each STATION, the CAUSES of DEATHS, and the RATIO of DEATHS to STRENGTH.

STATIONS.	Average Strength for the period of observation.	Causes of Deaths in Regimental Hospitals. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	Sudden Deaths out of Hospital.	Total Deaths. A. Of men present with their Regiments.	Total Deaths. B. Of men absent from their Regiments.	Died per 1,000 of Average Strength. A. With their Regiments. a. Cholera.	A. b. Sudden Deaths out of Hospital.	A. c. All Causes.	B. All Deaths, absent and present.
Troops on the march in Bengal and N. W. Provinces ...	...	...	...	3	1	...	4	5	...	...	2	...	...	...	...	...	...	4	1	20	...	...	...	...	...
Fort William ...	638	4	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	6	...	6·27		9·40	...
Alipore ...	960	3	...	2	1	...	4	4	...	...	3	...	...	...	1	...	1	...	2	21	...	3·13	2·08	21·88	...
Dum-Dum ...	475	1	...	...	...	...	2	...	...	...	1	...	1	...	...	...	...	1	...	6	...	2·11	...	12·63	...
Barrackpore ...	675	3	...	...	2	...	3	1	...	...	...	...	1	1	2	1	...	1	...	15	...	4·44	...	22·22	...
Berhampore ...	122	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	8·20	...	16·39	...
Dacca ...	309	5	...	...	...	...	...	...	...	1	2	1	...	...	...	...	...	...	...	9	...	16·18	...	29·13	...
Cachar and Sylhet ...	372	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2·69	...	2·69	...
Shillong ...	764	...	...	...	2	...	2	...	...	...	...	...	...	...	...	...	...	2	1	7	...	...	1·31	9·16	...
Gowhatty ...	511	4	...	1	...	...	1	...	...	...	...	...	6	...	...	2	...	...	...	14	...	7·83	...	27·40	...
Tezpore ...	189	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowgong ...	84	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	11·90	...
Upper Assam ...	813	...	...	3	1	...	...	...	...	...	1	1	2	1	...	...	...	1	...	10	...	...	...	12·30	...
Buxa ...	579	...	...	2	1	...	4	5	...	...	...	...	...	...	3	...	...	...	2	17	...	...	3·45	29·36	...
Julpigoree (11 months) ...	597	...	...	...	1	...	1	1	...	...	...	...	...	...	...	...	...	1	...	4	...	...	...	6·70	...
Bhaugulpore ...	211	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	7,248	22	...	9	8	...	17	11	...	1	7	2	11	3	6	3	1	7	5	113	48	3·03	·69	15·59	20·14
Dinapore ...	334	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	2	...	...	...	5·99	...
Segowlie ...	306	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	1	...	3	...	...	...	9·80	...
Benares ...	562	1	...	...	4	...	...	...	...	...	...	...	1	...	...	...	...	...	...	6	...	1·78	...	10·68	...
Chunar ...	68	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Goruckpore ...	701	...	...	1	1	...	...	...	...	...	1	...	...	...	...	...	...	1	...	4	...	...	...	5·71	...
Fyzabad ...	649	1	...	...	...	...	1	1	...	...	1	...	1	1	...	...	...	3	...	9	...	1·54	...	13·87	...
Lucknow ...	1,728	3	...	7	1	1	9	2	2	2	4	...	...	...	...	...	...	2	...	33	...	1·74	...	19·10	...
Seetapore ...	421	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	3	...	...	...	7·13	...
Futtehghur ...	182	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cawnpore ...	857	...	...	1	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	3	...	...	...	3·50	...
Allahabad	821	1	...	2	1	...	...	...	1	...	3	...	...	...	...	1	1	...	...	10	...	1·21	...	12·14	...
Nagode (10 months)	131	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	7·63	...
	6,742	6	...	13	8	1	12	4	3	3	10	...	2	1	...	2	1	8	...	74	57	·89	...	10·98	17·14
Shahjehanpore	359	...	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	8·35	...
Bareilly ...	916	...	1	1	1	...	...	...	...	...	...	1	1	...	...	...	1	...	...	6	...	...	...	6·55	...
Moradabad ...	400	...	1	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	3	...	...	...	7·50	...
Almorah ...	627	...	...	...	...	...	...	...	...	2	...	...	1	...	...	...	...	...	...	3	...	...	...	4·79	...
Raneekhet Roads ...	661	...	...	...	...	...	1	...	...	...	...	1	1	...	...	...	...	2	1	6	...	...	1·51	9·08	...
Chuckrata (11 months) ...	430	...	...	...	2	...	1	...	...	...	1	...	...	...	...	...	...	...	...	4	...	...	...	9·30	...
Deyrah	670	...	...	1	...	...	...	...	...	...	...	1	5	...	...	1	1	3	1	13	...	...	1·49	19·40	...
Roorkee	340	...	...	...	1	...	1	...	...	1	...	...	...	...	...	...	1	1	...	5	...	...	...	14·71	...
Meerut ...	804	2	...	...	4	...	3	...	...	...	3	...	1	...	...	...	...	1	...	14	...	2·49	...	17·41	...
Delhi ...	664	...	...	2	1	...	1	2	...	...	3	...	...	...	...	1	...	1	...	11	...	...	...	16·57	...
	5,835	2	3	5	10	...	7	2	...	3	7	3	9	1	...	3	3	8	2	68	43	·35	·35	11·65	16·61
Agra ...	1,058	...	...	3	1	...	...	1	1	1	7	...	3	...	...	...	...	...	...	17	...	...	...	16·07	...
Morar ...	1,433	...	...	7	2	1	...	4	...	...	5	1	...	...	1	...	...	...	1	22	...	...	·70	15·35	...
Seepree (10 months) ...	51	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jhansi ...	707	...	...	3	...	...	4	...	...	...	...	...	...	1	...	...	...	1	...	9	...	...	...	12·73	...
Nowgong ...	273	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lullutpore ...	71	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	28·17	...
Deolee	203	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	9·85	...
	3,786	...	...	13	4	1	7	5	1	1	12	1	3	1	1	...	...	1	1	52	23	...	·27	13·74	15·43
Umballa ...	907	...	...	1	1	...	...	...	...	...	2	...	...	...	...	...	...	1	...	5	...	...	...	5·51	...
Simla (8 months) ...	176	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2	...	...	...	11·36	...
Loodianah ...	55	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	18·18	...
Phillour ...	56	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	17·86	...
Jullundur ...	548	...	...	6	1	...	2	1	...	...	...	...	...	...	...	2	...	1	...	13	...	...	...	23·72	...
Ferozepore	648	...	...	1	2	...	...	...	...	...	6	...	...	...	...	...	...	2	1	12	...	...	1·54	18·52	...
Mooltan ...	936	...	...	3	1	...	...	...	...	...	1	...	1	...	...	...	...	...	...	9	...	...	...	9·62	...
Sealkote ...	1,013	...	...	...	4	...	2	...	...	...	...	1	1	...	...	...	...	2	...	10	...	...	...	9·87	...
Dhurmsalla	642	...	...	...	...	...	...	...	1	...	1	...	1	...	...	...	...	...	1	4	...	...	1·56	6·23	...
Bukloh ...	527	...	...	...	...	1	...	...	...	...	...	...	1	...	...	1	1	...	...	4	...	...	...	7·59	...
Umritsur ...	146	...	...	...	2	...	1	1	...	...	1	...	...	...	...	...	...	...	...	5	...	...	...	34·25	...
Meean Meer	1,371	...	...	28	2	3	1	2	...	1	30	...	1	...	...	3	...	1	1	73	...	...	·73	53·25	...
Jhelum	1,633	...	...	1	4	...	1	...	...	...	7	...	2	...	...	1	...	...	2	18	...	...	1·22	11·02	...
Rawulpindee ...	997	...	...	4	2	...	1	3	...	...	7	...	1	...	...	2	...	2	1	23†	...	...	1·00	23·07	...
Tallagunge ...	509	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Attock	165	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	6·06	...
Huzara (10 months)	660	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1·52	...
Murree (10 months) ...	80	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nowshera ...	880	...	...	7	1	...	2	2	...	...	4	...	1	...	...	...	...	...	1	18	...	...	1·14	20·45	...
Peshawur	3,664	...	1	21	11	2	15	5	...	1	21	1	1	1	...	2	2	1	2	87	...	...	·54	23·74	...
Troops on march, Punjab ...	...	...	...	5	1	1	3	1	...	...	7	...	...	...	...	...	...	...	...	18	...	...	...	...	...
	15,660	...	2	79	32	7	30	15	1	2	90	2	10	1	...	11	3	11	9	305	86	...	·57	19·48	22·27
Army of the Presidency ...	39,783	30	5	122	63	9	77	42	5	10	128	8	35	7	7	19	8	39	18	632	237	·75	·45	15·89	19·43
Central India Force* ...	4,054	...	1	15	5	...	3	1	1	...	5	1	...	...	...	1	4	4	3	44	8	...	·74	10·85	10·58
Punjab Frontier Force* ..	10,394	...	1	23	24	10	11	2	1	4	52	1	5	...	1	5	1	12	11	164	66	...	1·06	15·78	18·92

* For details for stations, see Regimental Table, Sections 6 and 7.

† Nine of these deaths occurred in the 25th Native Infantry, which arrived sickly from Peshawur in December.

NATIVE TROOPS, 1870.

XIV.

TABLE showing the PREVALENCE of CHOLERA in each MONTH, and the DISTRIBUTION of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength during the period of occupation.	Number of Admissions into Hospital in each Month.												Total Admissions of the Year.	Admission-rate per 1,000 of Strength for each Province.	Total Deaths of the Year.	Death-rate per 1,000 of Strength for each Province.
		Jan.	Feb.	Mar	April.	May	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.				
Fort William	698	1	2	1	1	...	1	...	...	...	...	...	...	6		4	
Alipore	900	...	...	1	4	2	1	...	...	...	...	...	...	8		3	
Dum-Dum	475	...	1	...	1	...	...	...	...	...	...	...	...	2		1	
Barrackpore	675	...	...	3	...	...	...	...	...	...	...	...	...	3		3	
Berhampore	122	...	...	...	...	...	1	...	...	...	...	...	...	1		1	
Dacca	309	2	...	...	2	1	...	...	...	...	...	...	...	5		5	
Cachar and Sylhet ...	372	1	...	...	...	...	...	...	...	...	...	...	...	1		1	
Shillong	764	...	...	...	...	1	...	...	...	...	...	...	...	1	5·2	...	3·03
Gowhatty ...	511	...	...	...	...	10	...	...	...	...	...	...	...	10		4	
Tezpore	189	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Nowgong ...	84	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Upper Assam	813	...	...	...	...	...	...	1	...	...	...	...	...	1		...	
Buxa	570	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Julpigoree (11 months) ...	597	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Bhaugulpore	211	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Dinapore	334	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Segowlie...	306	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Benares	562	...	...	...	...	...	...	...	1	...	...	...	...	1		1	
Chunar	68	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Goruckpore	701	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Fyzabad	640	...	...	...	2	...	...	...	...	...	...	...	...	2	1·0	1	·80
Lucknow	1,728	...	...	...	3	...	...	...	...	...	...	...	...	3		3	
Seetapore ...	421	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Futtehghur	182	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Cawnpore	857	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Allahabad	824	...	1	...	...	...	...	...	...	...	...	...	...	1		1	
Nagode (10 months)	131	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Shahjehanpore	350	...	...	...	...	1	...	...	...	...	...	...	...	1		...	
Bareilly ...	916	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Moradabad ...	400	...	...	1	...	...	...	...	...	...	...	...	...	1		...	
Almorah ...	627	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Raneekhet Roads	661	...	...	...	...	...	...	...	...	...	...	...	...	...	·9	...	·55
Chuckrata (11 months)	490	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Deyrah	670	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Roorkee	340	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Meerut	804	...	...	...	1	1	...	...	...	...	...	...	...	2		2	
Delhi	664	...	...	...	...	1	...	...	...	...	...	...	...	1		...	
Agra	1,058	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Morar ...	1,133	...	...	1	...	...	...	...	...	...	...	...	...	1		...	
Seepree (10 months)	51	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Jhansi	707	...	...	...	...	...	...	...	...	...	...	...	...	...	·3	...	...
Nowgong ...	273	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Lullutpore ...	71	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Deolee ...	208	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Umballa ...	907	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Simla (8 months) ...	176	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Loodianah ...	55	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Phillour	56	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Jullundur ...	548	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Ferozepore ...	648	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Mooltan	936	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Sealkote ...	1,013	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Dhurmsalla	642	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Bukloh	527	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Umritsur	140	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meean Meer ...	1,371	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Jhelum	1,633	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Rawulpindee ...	997	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Tallagunge	500	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Attock ...	165	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Huzara (10 months) ...	600	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Murree (10 months)... ...	80	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Nowshera ...	880	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Peshawur	3,664	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Troops on march, Punjab	...	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Troops on march, Bengal and N. W. Provinces ..		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
TOTAL	39,783	4	4	7	14	17	3	1	1	...	...	...	...	51	1·3	30	75
Murdan	891	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Abbottabad ...	1,480	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Kohat	2,412	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Bunnoo	1,760	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dera Ismael Khan	1,716	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Dera Ghazee Khan ...	1,679	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Rajanpore ...	398	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Bhawulpore (4 months)	90	...	...	...		...	...	...	...	...	...	...	...	...		...	
TOTAL ...	10,394	...	...	...	...	...		...	...	...		...	...	...	...	...	
Augur	250	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Goonah	331	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Sehore	816	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Sirdarpore ...	410	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kherwarrah ...	600	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Erinpoorah	814	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
Deolee	773	...	...	...	...	...	...	...	...	...	...	...	...	...		...	
TOTAL ...	4,054	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

The Madras Native Troops occupying the Southern Stations of the Bengal Presidency with a strength of 3,631, had no admission from cholera.

NATIVE TROOPS, 1870.

XV.

TABLE showing the PREVALENCE of FEVER in each MONTH, and the DISTRIBUTION of FEVERS by STATIONS and PROVINCES.

STATIONS AND AVERAGE STRENGTH DURING THE PERIOD OF OCCUPATION.		NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions of the Year.	Admission-rate of each Station per 1,000 of Strength.	Admission-rate for each Province.	Total Deaths of the Year.	Death-rate for each Province.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.					
Fort William	638	27	23	25	14	79	80	120	98	107	40	38	26	686	1075·2		...	
Allipore	960	69	58	74	85	47	72	90	147	82	91	88	60	913	951·0		3	
Dum-Dum	475	15	15	26	14	9	10	13	28	17	29	29	13	218	458·9		...	
Barrackpore	675	22	9	12	12	14	13	29	109	25	20	35	43	343	508·2		2	
Berhampore	122	10	16	19	37	14	10	1	7	4	5	9	4	136	1114·7		1	
Dacca	309	5	6	6	7	5	11	3	13	5	8	24	5	91	294·5		...	
Cachar and Sylhet	372	27	19	20	9	10	25	49	59	36	54	47	27	382	1026·9		...	
Shillong	764	8	5	4	10	35	21	20	25	16	30	21	14	209	273·6	668·1	2	2·34
Gowhatty	511	40	22	17	14	11	25	99	90	57	24	37	37	482	943·2		1	
Tezpore	189	13	14	12	11	12	14	19	33	15	6	19	25	193	1021·2		...	
Nowgong	84	1	...	...	1	1	...	2	...	...	2	5	5	17	202·4		...	
Upper Assam	818	40	15	15	15	26	54	96	177	93	98	64	30	728	895·5		4	
Buxa	579	19	7	9	17	39	19	12	25	23	24	66	19	279	481·9		3	
Julpigoree (11 months) ...	597	**	16	9	10	16	14	20	8	8	10	22	10	143	239·5		1	
Bhaugulpore	211	2	...	3	2	1	1	1	3	2	3	2	2	22	104·3		...	
MONTHLY PERCENTAGE OF THE TOTAL		6·2	4·6	5·2	4·3	6·6	7·8	11·8	17·2	10·2	9·1	10·4	6·6	...	...	100·0	...	.
Dinapore	334	10	4	11	1	6	2	6	13	11	18	22	1	105	314·4		...	
Segowlie	306	5	4	2	3	3	2	5	12	13	16	15	9	89	290·8		...	
Benares	502	17	17	16	10	38	7	9	28	38	57	73	29	339	675·2		4	
Goruckpore	701	12	11	17	14	5	3	8	9	30	35	53	28	225	321·0		2	
Fyzabad	649	10	7	12	13	13	8	17	21	38	84	58	23	303	466·9		...	
Lucknow	1,728	15	68	96	61	74	45	76	60	59	183	208	73	1,018	589·1	640·7	8	3·12
Seetapore	421	11	6	13	7	7	5	6	13	18	47	26	6	165	391·9		2	
Futtehghur	182	3	1	4	5	2	9	4	6	32	51	21	8	146	802·2		...	
Cawnpore	857	20	23	19	12	18	19	47	76	134	319	235	68	1,020	1190·2		2	
Allahabad	824	6	11	8	18	21	14	45	110	124	271	131	61	820	1000·1		3	
Nagode (11 months) ...	131	3	4	3	7	4	8	5	10	5	9	**	**	58	442·8		...	
MONTHLY PERCENTAGE OF THE TOTAL		2·6	3·6	4·0	3·5	4·5	2·8	5·3	8·5	11·6	20·1	19·7	7·2	...	...	100·0	...	...
Shahjehanpore	359	1	5	4	12	9	10	17	13	10	16	10	5	112	312·0		2	
Bareilly	916	3	15	12	26	39	27	22	18	17	29	43	11	262	286·0		2	
Moradabad	400	3	2	4	4	8	1	6	14	20	45	21	13	144	360·0		...	
Almorah	627	13	8	10	13	15	31	26	30	35	23	18	8	239	381·2		...	
Raneekhet Roads	661	6	5	6	9	18	9	18	36	26	11	30	12	195	295·0		...	
Chuckrata (11 months) ...	430	3	...	7	2	9	4	12	16	27	6	14	**	100	232·6	535·6	2	2·57
Deyrah	670	4	5	12	6	10	7	15	20	36	10	6	4	144	214·9		1	
Roorkee	340	4	2	1	3	6	2	3	41	61	41	15	24	206	605·9		1	
Meerut	804	10	24	69	25	59	22	14	37	137	150	85	15	647	804·7		4	
Delhi	664	25	12	14	30	133	45	42	143	181	206	177	68	1,076	1620·5		3	
MONTHLY PERCENTAGE OF THE TOTAL		2·3	2·5	4·4	4·2	10·1	5·1	5·6	12·1	17·7	17·1	13·8	5·1	...	...	100·0	...	. .
Agra	1,058	19	31	28	59	56	15	24	50	54	103	171	91	701	662·6		4	
Morar	1,433	130	78	232	308	408	165	155	365	363	426	395	190	3,215	2243·5		9	
Jhansi	707	29	16	17	13	17	4	23	61	109	71	31	8	402	568·6	1375·5	3	4·49
Nowgong	273	24	10	7	11	15	17	21	42	57	69	60	34	367	1344·3		...	
Lullutpore	71	2	3	1	1	10	1	15	41	34	29	16	4	157	2211·2		1	
Deolee	203	38	5	6	50	25	12	8	26	41	49	41	41	342	1684·7		...	
MONTHLY PERCENTAGE OF THE TOTAL		4·6	2·7	5·6	8·5	10·2	4·1	4·8	11·3	12·9	14·5	13·7	7·1	...	...	100·0	...	...
Umballa	907	15	6	8	16	23	21	30	110	109	209	101	20	767	845·6		2	
Simla (8 months)	176	**	**	**	9	18	7	6	8	8	9	7	**	72	409·1		...	
Jullundur	548	..	7	5	3	22	28	41	132	174	104	95	26	637	1162·4		7	
Ferozepore	648	40	45	21	12	25	18	12	15	22	31	26	8	276	425·9		3	
Mooltan	936	20	11	14	20	28	15	11	28	93	77	66	19	411	439·1		4	
Sealkote	1,013	16	8	3	12	24	18	29	73	131	120	61	13	511	504·4		4	
Dhurmsalla	642	27	11	12	17	34	67	51	77	36	20	19	39	410	638·6		...	
Bukloh	527	7	1	8	8	16	11	16	27	13	9	4	5	128	242·9		...	
Umritsur	146	7	8	7	6	2	3	3	10	13	20	7	6	92	630·1		2	
Meean Meer	1,371	133	87	87	64	71	63	82	47	99	183	224	92	1,182	862·2	992·6	30	7·00
Jhelum	1,633	51	35	46	28	57	48	71	100	139	230	235	52	1,098	672·4		5	
Rawulpindee	997	79	33	50	16	41	48	50	105	216	101	170	79	988	991·0		6	
Tallagunge	509	7	17	17	18	24	22	25	32	33	25	74	66	360	707·2		...	
Attock	165	7	7	9	5	5	6	7	17	31	37	54	18	203	1230·3		...	
Hazara (10 months) ...	660	8	13	13	18	14	23	44	116	102	36	**	**	387	586·4		...	
Murree (10 months) ...	80	6	2	7	6	14	8	5	8	10	1	**	**	67	837·5		...	
Nowshera and outposts ...	880	91	33	81	35	33	43	57	72	196	218	418	187	1,464	1663·6		8	
Peshawur and outposts ...	3,664	167	89	115	155	208	237	251	520	1,268	1,366	1,131	323	5,890	1607·5		32	
MONTHLY PERCENTAGE OF THE TOTAL		5·0	3·1	3·2	2·9	5·1	4·6	5·0	10·0	18·2	18·4	18·3	6·2	...	...	100·0	...	...
MONTHLY PERCENTAGE OF THE TOTAL FOR THE PRESIDENCY ...	...	4·9	3·2	4·2	4·2	6·4	4·7	6·0	11·2	15·2	17·1	16·5	6·4	...	...	100·0	...	...
Murdan	891	52	11	11	24	50	50	56	85	102	238	139	54	871	977·6		...	
Abbottabad	1,486	91	99	86	90	258	168	163	377	438	328	235	92	2,424	1631·2		2	
Kohat	2,442	170	91	129	175	239	136	140	256	649	676	731	287	3,679	1506·6		19	
Bunnoo	1,760	134	80	95	75	114	76	74	131	343	535	637	178	2,472	1404·5	1330·6	10	4·52
Dera Ismael Khan	1,716	102	50	54	43	226	88	78	74	160	254	288	106	1,533	893·4		8	
Dera Ghazee Khan	1,079	61	47	46	54	84	65	46	105	409	510	393	113	1,962	1818·4		6	
Rajanpore	393	37	24	24	24	43	23	9	31	136	252	184	92	882	2244·3		2	
MONTHLY PERCENTAGE OF THE TOTAL		4·7	2·9	3·2	3·6	7·3	4·3	4·1	7·7	16·2	20·4	18·9	6·7	...	...	100·0	...	.
Augur	250	4	3	4	5	3	6	11	18	15	28	24	5	126	504·0		1	
Goonah	331	2	1	1	1	8	7	1	...	6	6	6	19	58	175·2		1	
Sehore	816	55	40	38	75	33	19	42	77	66	106	75	37	663	812·5		4	
Sirdarpore	410	11	10	9	15	21	16	11	7	29	33	27	27	216	526·8	638·3	4	4·93
Kherwarrah	660	36	11	21	27	21	16	31	51	75	91	72	37	489	740·9		2	
Erinpoorah	814	13	12	16	18	7	3	12	37	21	60	50	12	261	320·6		2	
Deolee	773	28	25	23	17	71	26	38	70	144	172	101	60	775	1002·6		5	
MONTHLY PERCENTAGE OF THE TOTAL		6·7	4·0	4·3	6·1	6·3	3·6	5·6	10·1	13·8	19·2	13·7	7·6	...	...	100·0	...	...

NATIVE

X

ABSTRACT of the RETURNS showing the ADMISSIONS,

(The Statistics in this Table must not be regarded as showing with

1—*REGIMENTS of BENGAL*

	REGIMENTS AND STATION OF 1870.	Date of Arrival from Station previously occupied.	REGIMENTAL STRENGTH. Number borne on the Rolls.*	REGIMENTAL STRENGTH. Average Strength present during 1870.	[illegible]	INVALIDED. To their homes for change of air.	INVALIDED. For Discharge.	DIED. With the Regiment.	DIED. Absent from the Regiment.	LOSS PER 1,000 [illegible]	LOSS PER 1,000 [illegible]
1	22nd Native Infantry, Fort William... ...	December 1869, from Morar ...	668	638	[illegible]	12	5	6	1	[illegible]	[illegible]
2	8th Native Infantry, Alipore	December 1869, from Jhansi ...	697	618	[illegible]	4	13	19	4	[illegible]	[illegible]
3	Body Guard, Ballygunge	......	126	115	[illegible]	...	2	1	...	[illegible]	[illegible]
4	11th Native Infantry, Dum-Dum, with Detachment of 230 men at Alipore ...	November 1868, from Dinapore ...	749	698	[illegible]	8	11	7	4	[illegible]	[illegible]
5	13th Native Infantry, Barrackpore	December 1869, from Jullundur ...	708	610	[illegible]	14	6	15	5	[illegible]	[illegible]
6	Head-Quarters and Left Wing, 7th Native Infantry, Dacca	December 1867, from Allahabad	704	309	[illegible]	21	1	9	3	[illegible]	[illegible]
7	Right Wing, 7th Native Infantry, Cachar ...			338	[illegible]						
8	44th Native Infantry, Shillong, with Detachment of 58 men at Jowaie	A Local Corps	878	877	[illegible]	8	27	8	2	[illegible]	[illegible]
9	43rd Native Infantry, Gowhatty, with Detachments at Tezpore and Nowgong ...	A Local Corps	885	778	[illegible]	9	13	15	2	[illegible]	[illegible]
10	44th Native Infantry, Debrooghur and Upper Assam	A Local Corps	872	812	[illegible]	8	13	10	5	[illegible]	[illegible]
11	41st Native Infantry, Buxa	December 1868, from Agra ...	664	579	[illegible]	11	2	17	11	[illegible]	[illegible]
12	2nd Native Infantry, Julpigoree	February 1870, from Alipore ...	705	607	[illegible]	41	33	5	8	[illegible]	[illegible]
13	Head-Quarters and Right Wing, 37th Native Infantry, Bhaugulpore, with Detachment of 122 men at Berhampore	December 1868, from Goruckpore	338	342	[illegible]	4	1	2	2	[illegible]	[illegible]
	REGIMENTS OF BENGAL PROPER AND ASSAM ...		7,994	7,330	[illegible]	140	127	114	47	[illegible]	[illegible]

2.—*REGIMENTS of BEHAR, BENARES,*

	REGIMENTS AND STATION OF 1870.	Date of Arrival from Station previously occupied.	Number borne on the Rolls.*	Average Strength present during 1870.	[illegible]	To their homes for change of air.	For Discharge.	With the Regiment.	Absent from the Regiment.	[illegible]	[illegible]
1	Left Wing, 37th Native Infantry, Dinapore ..	November 1869, from Bhaugulpore	355	311	[illegible]	7	1	2	...	[illegible]	[illegible]
2	4th Bengal Cavalry, Segowlie, with Detachment of 70 men at Goruckpore ...	December 1869, from Bareilly ...	457	397	[illegible]	7	1	3	6	[illegible]	[illegible]
3	5th Native Infantry, Benares, with Detachment of 63 men at Chunar	January 1868, from Dacca ...	709	605	[illegible]	11	26	6	6	[illegible]	[illegible]
4	18th Native Infantry, Goruckpore	December 1868, from Bhaugulpore	703	623	[illegible]	15	27	4	6	[illegible]	[illegible]
5	38th Native Infantry, Fyzabad	November 1868, from Nagode ...	750	652	[illegible]	5	...	9	2	[illegible]	[illegible]
6	13th Bengal Cavalry, Lucknow	March 1868, from Peshawur ...	467	380	[illegible]	22	2	7	1	[illegible]	[illegible]
7	9th Native Infantry†, Lucknow	February 1870, from Barrackpore	709	632	[illegible]	31	6	24	13	[illegible]	[illegible]
8	34th Native Infantry, Lucknow	February 1867, from Barrackpore	711	711	[illegible]	6	2	3	1	[illegible]	[illegible]
9	17th Bengal Cavalry, Seetapore, with Detachment of 140 men at Fyzabad ...	January 1869, from Barrackpore...	460	420	[illegible]	10	3	3	1	[illegible]	[illegible]
10	6th Bengal Cavalry, Cawnpore	December 1867, from Sealkote and Jhansi	457	384	[illegible]	2	2	1	1	[illegible]	[illegible]
11	10th Native Infantry, Cawnpore	January 1869, from Mooltan ...	692	611	[illegible]	2	15	2	2	[illegible]	[illegible]
12	11th Bengal Cavalry, Allahabad, with Detachment of 74 men at Barrackpore ...	December 1868, from Umballa ...	468	378	[illegible]	8	1	1	4	[illegible]	[illegible]
13	4th Native Infantry, Allahabad	December 1867, from Jhansi ...	706	592	[illegible]	19	8	18	5	[illegible]	[illegible]
	REGIMENTS OF BEHAR, BENARES, OUDE AND CAWNPORE ...		7,644	6,696	[illegible]	145	94	83	48	[illegible]	[illegible]

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* Strength as on 1st January. The Loss by Death and Invaliding is calculated on this Strength, and the Admission-rate on the Average Strength present throughout the year, as shown in the second column. See Introductory Note.

† Sickly from the effects of the climate of Lower Bengal in the previous year.

TROOPS, 1870.

VI.

DEATHS, and INVALIDING of each REGIMENT for the Year.

curacy the relation to Locality of the Sickness and Mortality of Regiments.)

PROPER, BHOOTAN, and ASSAM.

	Total Admissions into Hospital, and Deaths in Hospital during the year.		Causes of Admissions into Hospital and of Deaths in Hospital during the Year.																									
			Cholera.	Fevers.	Venereal Affections.	Rheumatism.	Scurvy.	Anæmia and Debility.	Dropsy.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Neuralgic Affections.	Eye Diseases.	Heart Disease.	Bronchitis and Asthma.	Pneumonia and Pleurisy.	Dysentery and Diarrhœa.	Spleen Disease.	Hepatitis.	Diseases of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Scabies and Skin Diseases.	Guinea-worm.	Abscess and Ulcer.	Injuries.	Punished.	All other Causes.
1	Admissions	1,481	5	684	23	50	3	22	1	4	1	23	14	...	90	6	170	8	2	50	6	6	113	3	89	67	...	11
	Deaths	6	4	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	Admissions	1,472	7	675	30	28	11	14	...	...	...	16	12	...	27	7	326	8	...	14	...	22	26	...	47	102	...	101*
	Deaths	19	3	3	...	...	1	...	...	...	...	...	...	...	3	...	7	...	...	...	...	...	...	...	...	2	...	...
3	Admissions	269	...	110	3	6	...	...	...	...	...	3	...	...	30	1	39	4	...	16	1	1	6	...	19	25	...	5
	Deaths	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
4	Admissions	792	3	339	20	19	3	12	...	1	...	7	8	1	32	3	154	1	3	11	1	5	13	...	33	64	...	50†
	Deaths	7	1	...	...	...	...	...	...	1	...	...	...	...	...	1	3	...	...	...	...	...	...	...	...	...	...	1
5	Admissions	744	3	320	47	18	7	6	...	3	...	18	9	...	41	4	90	3	...	27	...	2	13	2	52	63	1	15
	Deaths	15	3	2	...	...	2	...	1	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	2
6	Admissions	344	5	91	10	18	...	4	...	...	...	3	3	1	11	1	63	2	2	27	1	3	7	...	24	28	...	40
	Deaths	9	5	...	...	...	...	...	...	...	...	...	...	1	1	1	...	1	...	...	...	...	...	...	...	...	...	...
7	Admissions	552	...	366	17	25	...	5	...	...	...	...	13	...	21	...	25	...	...	17	...	4	2	...	12	30	...	6
	Deaths	None	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	Admissions	773	2	221	36	34	2	14	...	...	2	18	13	1	49	6	77	60	4	19	...	7	12	...	56	127	...	13
	Deaths	8	1	2	...	...	...	...	...	...	...	...	...	...	1	...	2	...	...	...	...	...	...	...	...	1	...	...
9	Admissions	1,250	10	687	40	32	...	31	5	6	...	...	17	...	40	5	93	19	3	36	...	9	23	...	57	111	...	26
	Deaths	15	4	1	...	...	...	2	1	6	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...
10	Admissions	1,297	1	727	3	44	1	7	3	1	...	6	14	1	60	2	113	19	1	12	1	7	53	...	92	115	...	14
	Deaths	10	...	1	...	1	...	...	1	2	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...
11	Admissions	777	...	279	8	32	17	...	...	1	...	7	1	...	30	2	172	...	...	41	...	...	21	...	48	70	...	48‡
	Deaths	14	...	3	...	...	1	...	...	...	...	...	...	...	...	...	9	...	...	...	...	...	...	...	...	2	...	...
12	Admissions	416	...	150	8	25	4	4	...	...	...	7	5	...	16	...	106	5	...	10	...	5	9	...	16	15	...	22
	Deaths	5	...	1	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	2
13	Admissions	347	1	160	34	16	...	...	...	4	1	...	12	...	1	...	28	8	...	1	...	...	6	...	39	23	...	13
	[illegible]	2	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Admissions	10,514	37	4,818	279	347	48	119	9	20	4	107	121	4	448	37	1,456	137	15	281	10	71	304	5	584	840	1	[illegible]
	Deaths	114	22	17	...	1	4	2	3	11	...	...	...	2	6	...	25	1	...	...	...	...	...	...	...	6	...	...

OUDE and CAWNPORE.

	Total Admissions into Hospital, and Deaths in Hospital during the year.		Cholera.	Fevers.	Venereal Affections.	Rheumatism.	Scurvy.	Anæmia and Debility.	Dropsy.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Neuralgic Affections.	Eye Diseases.	Heart Disease.	Bronchitis and Asthma.	Pneumonia and Pleurisy.	Dysentery and Diarrhœa.	Spleen Disease.	Hepatitis.	Diseases of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Scabies and Skin Diseases.	Guinea-worm.	Abscess and Ulcer.	Injuries.	Punished.	All other Causes.
1	Admissions	223	...	103	17	6	...	1	...	...	1	5	4	...	7	...	24	...	2	5	1	1	5	...	25	9	...	7
	Death	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...
2	Admissions	330	...	116	14	11	...		...	...	...	1	7	...	6	1	35	...	...	17	1	2	10	...	21	69	...	19
	Deaths	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...
3	Admissions	686	1	350	43	10	...	9	...	2	...	4	9	...	10	...	53	16	1	18	...	3	13	2	30	39	...	38
	Deaths	3	1	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	Admissions	585	...	205	59	17	...	22	...	4	...	2	39	1	25	7	37	3	2	6	2	6	22	...	46	57	...	23
	Deaths	1	...	2	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...
5	Admissions	559	1	304	27	17	...	...	2	2	...	8	16	1	5	10	45	3	...	23	...	4	4	...	51	8	...	28
	Deaths	6	1	...	...	...	...	...	1	1	...	...	...	...	...	1	2	...	...	...	...	...	...	...	...	...	...	...
6	Admissions	568	3	210	26	37	...	1	...	...	...	6	28	...	6	6	36	1	4	14	7	7	6	...	80	73	...	8
	Deaths	7	3	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	3	...	...	...	...	...	...	...	...	...
7	Admissions	1,242	...	588	23	44	1	...	...	1	1	...	13	...	18	9	265	30	...	23	...	5	30	...	82	58	...	33
	Deaths	24	...	1	...	...	...	...	...	...	1	...	...	...	1	3	16	2	...	...	...	...	...	...	...	...	...	...
8	Admissions	579	...	306	12	11	1	...	...	1	...	1	35	...	14	6	71	4	...	11	...	1	10	...	44	35	...	16
	Deaths	3	...	2	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...
9	Admissions	533	1	165	19	20	6	3	...	1	1	9	21	2	28	4	43	1	4	20	1	6	12	...	70	55	...	11
	Deaths	3	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	Admissions	484	...	239	35	3	...	8	...	...	...	...	11	...	13	2	14	3	1	19	...	3	15	...	58	56	...	4
	Deaths	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...
11	Admissions	1,257	...	801	27	14	1	4	1	8	...	5	15	...	8	4	80	3	...	11	...	10	25	...	121	96	...	23
	Deaths	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	Admissions	207	...	137	11	11	...	1	...	...	...	...	9	...	3	...	43	1	1	4	...	2	10	1	11	44	...	8
	Deaths	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
13	Admissions	1,154	1	670	26	26	1	3	...	1	...	2	6	...	23	6	259	1	1	7	1	1	11	...	46	46	...	18
	Deaths	18§	1	4	...	...	...	1	...	...	...	...	...	...	1	1	9	...	1	...	...	...	...	...	...	...	...	...
	Admissions	8,477	7	4,194	338	245	10	52	3	20	3	43	213	4	106	55	1,005	75	16	187	13	51	182	3	700	644		230
	Deaths	83	6	20	...	...	...	2	1	2	1	...	...	...	3	6	32	3	3	...	...	...	...	...	1	1	...	5

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* 88 Mumps. † 44 Mumps. ‡ 30 Goitre.

§ Ten of these deaths occurred in December after the removal of the Regiment to Eastern Bengal.

3.—REGIMENTS *of* ROHILCUND

	REGIMENTS AND STATION OF 1870.	Date of Arrival from Station previously occupied.	REGIMENTAL STRENGTH. Number borne on the Rolls.	REGIMENTAL STRENGTH. Average Strength present during 1870.	Admissions per 1,000 of Strength.	INVALIDED. To their homes for change of air.	INVALIDED. For Discharge.	DIED. With the Regiment.	DIED. Absent from the Regiment.	LOSS PER 1,000. By Invaliding for Discharge.	LOSS PER 1,000. By Deaths.
1	10th Native Infantry, Wing, Shahjehanpore ...	December 1868, from Fyzabad ...	731	361	[illegible]	15	4	6	6	5·47	16·42
2	10th Native Infantry, Head-Quarters, Moradabad	January 1869, from Fyzabad ...		362	[illegible]						
3	2nd Bengal Cavalry, Bareilly	February 1870, from Deolee and Jhansi ...	438	396	1050·5	3	6	2	...	13·70	4·57
4	27th Native Infantry, Bareilly	March 1868, from Peshawur ...	689	603	[illegible]	...	21	4	2	30·48	8·71
5	32nd Native Infantry, Raneekhet	December 1869, from Dinapore ...	706	650	951·5	9	2	6	...	2·83	8·50
6	3rd Goorkhas, Almorah, with Detachments at Petoraghur and Nynee Tal ...	April 1866, from Bhootan ...	712	627	[illegible]	11	24	3	2	33·71	7·02
7	Sappers and Miners, Chuckrata, with Depôt of 297 men at Roorkee ...	......	830	755	[illegible]	3	24	9	6	28·92	18·07
8	2nd Goorkhas, Deyrah	January 1869, from Rawulpindee...	713	674	731·4	3	5	13	...	7·01	18·23
9	8th Bengal Cavalry, Meerut, with Detachment of 65 men at Delhi ...	February 1870, from Segowlie ...	460	425	[illegible]	8	12	2	2	26·09	8·70
10	3rd Native Infantry, Meerut	March 1870, from Peshawur ...	693	630	[illegible]	22	31	24	5	44·73	41·85
11	17th Native Infantry, Delhi	November 1867, from Barrackpore	710	644	[illegible]	17	10	10	9	14·08	26·76
	REGIMENTS OF ROHILCUND AND MEERUT ...		6,682	6,120	[illegible]	91	139	79	32	20·80	16·61

4 - REGIMENTS *of* AGRA

	REGIMENTS AND STATION OF 1870.	Date of Arrival from Station previously occupied.	Number borne on the Rolls.	Average Strength present during 1870.	Admissions per 1,000 of Strength.	To their homes for change of air.	For Discharge.	With the Regiment.	Absent from the Regiment.	By Invaliding for Discharge.	By Deaths.
1	1st Native Infantry, Agra	November 1868, from Dum-Dum ...	709	641	[illegible]	12	14	11	2	19·75	18·34
2	40th Native Infantry, Agra, with Detachment of 183 men at Futtehghur for 10 months...	February 1869, from Banda and Nowgong ...	706	655	[illegible]	9	2	7	3	2·83	14·16
3	1st Bengal Cavalry, Morar	December 1867, from Nowgong ...	461	384	[illegible]	13	11	4	...	23·86	8·68
4	6th Native Infantry, Morar	January 1870, from Julpigoree ...	652	580	[illegible]	35	18	9	2	27·61	16·87
5	33rd Native Infantry, Morar	March 1867, from Lucknow ...	718	627	[illegible]	5	1	13	2	1·39	20·89
6	39th Native Infantry, Jhansi, with Detachment of 70 men at Lullutpore ...	December 1869, from Lucknow ...	701	621	[illegible]	13	10	10	5	14·26	21·39
7	7th Bengal Cavalry, Nowgong, with Detachment of 131 men at Nagode	December 1867, from Lucknow ...	451	377	[illegible]	18	18	1	...	39·91	2·22
8	14th Bengal Cavalry, Deolee, with Detachment of 123 men at Jhansi	December 1869, from Meerut ...	464	323	[illegible]	12	6	3	3	12·93	12·93
	REGIMENTS OF AGRA AND CENTRAL INDIA ...		4,862	4,208	[illegible]	117	80	58	17	16·45	15·43

5.—REGIMENTS *of*

	REGIMENTS AND STATION OF 1870.	Date of Arrival from Station previously occupied.	Number borne on the Rolls.	Average Strength present during 1870.	Admissions per 1,000 of Strength.	To their homes for change of air.	For Discharge.	With the Regiment.	Absent from the Regiment.	By Invaliding for Discharge.	By Deaths.
1	12th Bengal Cavalry, Umballa, with Detachment of 65 men at Jullundur ...	December 1868, from Abyssinia ...	462	413	975·1	8	4	2	3	8·66	10·82
2	26th Native Infantry, Umballa	January 1869, from Mehidpore and Augur ...	708	604	[illegible]	12	14	3	2	19·77	7·06
3	14th Native Infantry, Jullundur, with Detachments of 55 men at Phillour and Loodianah	January 1870, from Fort William	631	649	[illegible]	3	30	19	6	47·54	39·62
4	28th Native Infantry, Ferozepore	February 1870, from Peshawur ...	682	618	[illegible]	5	7	12	3	10·26	21·99
5	19th Bengal Cavalry, Mooltan	March 1870, from Peshawur ...	461	376	[illegible]	9	5	2	4	10·85	13·01
6	45th Native Infantry, Mooltan	December 1868, from Peshawur ...	677	622	[illegible]	18	3	8	5	4·43	19·20
7	10th Bengal Cavalry, Sealkote	January 1869, from Abyssinia ...	449	367	[illegible]	9	1	3	3	2·23	13·36
8	12th Native Infantry, Sealkote	February 1869, from Jubbulpore...	695	648	[illegible]	8	32	7	1	46·04	11·51
9	1st Goorkhas, Dhurmsalla	March 1867, from Buxa ...	714	640	[illegible]	3	35	4	2	49·02	8·40
10	4th Goorkhas, Bukloh, with Detachment of 176 men at Simla for 8 months ...	April 1866, from Almorah ...	745	640	[illegible]	2	4	6	1	5·37	9·40
11	9th Bengal Cavalry, Meean Meer	December 1866, from Peshawur ...	452	400	[illegible]	28	6	2	2	13·27	8·85
12	21st Native Infantry, Meean Meer	August 1868, from Abyssinia ...	680	528	[illegible]	19	6	22	9	8·82	45·59
13	35th Native Infantry, Meean Meer, with Detachment of 156 men at Umritsur for 7 months	March 1869, from Saugor ...	670	660	[illegible]	5	10	59	...	14·93	88·06
14	3rd Bengal Cavalry, Jhelum	December 1868, from Peshawur ...	460	398	[illegible]	6	4	1	2	8·70	6·52
15	29th Native Infantry, Jhelum	March 1869, from Shahjehanpore and Moradabad ...	720	621	[illegible]	22	7	8	5	9·72	18·06
16	30th Native Infantry, Jhelum	December 1869, from Cawnpore ...	694	604	[illegible]	9	16	10	...	23·05	14·41

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* This Regiment arrived sickly from Peshawur; eleven deaths
† 18 Nyctal
‡ 33 Nyctal
§ Regiment in a weakly state
‖ The 21st N. I. reached Peshawur in course of relief in the middle of November;
¶ The 35th Regiment suffered from a fever, apparently

and MEERUT.

	Total Admissions into Hospital, and Deaths in Hospital during the Year.		Causes of Admissions into Hospital and of Deaths in Hospital during the Year.																								
			Cholera.	Fevers.	Venereal Affections.	Rheumatism.	Scurvy.	Anaemia and Debility.	Dropsy.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Neuralgic Affections.	Eye Diseases.	Heart Disease.	Bronchitis and Asthma.	Pneumonia and Pleurisy.	Dysentery and Diarrhoea.	Spleen Disease.	Hepatitis.	Diseases of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Scabies and Skin Diseases.	Guinea-worm.	Abscesses and Ulcers.	Injuries.	Punished.	All other Causes.
1	Admissions ...	187	1	113	9	6	...	1	...	4	...	...	5	...	2	...	17	...	...	1	...	...	...	...	7	6	...	15
	Deaths	3	...	2																								
2	Admissions ...	212	1	141	11	3	...	1	1	1	...	...	1	...	3	2	10	...	...	3	...	1	3	...	20	8	...	3
	Deaths	3						1	1																			
3	Admissions ...	417	...	175	12	14	1	...	...	...	...	2	19	...	7	10	14	...	...	6	...	1	9	2	53	90	...	2
	Deaths	2		1																						1		
4	Admissions ...	338	...	108	30	22	...	1	...	1	...	2	10	1	7	2	12	3	1	3	2	2	28	..	59	30	...	11
	Deaths			1						1				1														
5	Admissions ...	620	...	197	43	43	...	...	...	...	...	5	10	2	9	2	61	1	...	31	3	...	8	...	10	184	...	20
	Deaths	6								1				1			1				1					1		
6	Admissions ...	561	...	239	36	63	...	2	...	4	...	...	11	...	28	12	24	5	4	10	...	11	5	...	45	50	...	12
	Deaths	3								1								2										
7	Admissions ...	603	...	308	28	16	...	10	...	...	...	4	11	...	17	12	49	4	...	17	...	...	13	...	39	45	..	26
	Deaths			3												1	2	1								1		
8	Admissions ...	403	...	144	31	20	...	3	...	7	...	...	45	...	5	8	14	46	5	22	...	3	17	...	29	63	...	10
	Deaths	13		1				1						1														
9	Admissions ...	272	...	134	14	15	...	1	...	...	...	3	5	...	9	6	20	...	2	4	1	2	9	1	7	30	...	9
	Deaths	2						1									1											
10	Admissions ...	1,165	3	673	10	33	...	9	...	2	...	6	4	...	52	65	105	13	3	18	..	2	13	...	85	61	...	9
	Deaths	24	2	7						1																		
11	Admissions ...	1,360	1	1,047	4	23	...	2	...	...	...	1	1	...	16	7	82	7	2	13	...	1	10	..	93	83	...	17
	Deaths	10		3											2	1												
	Admissions ...	6,237	5	3,279	228	258	1	30	1	19	...	23	122	3	155	126	408	70	17	126	6	22	113	3	447	626	...	134
	Deaths							3	1																			
and CENTRAL INDIA.																												
1	Admissions ...	815	...	377	60	41	...	13	...	1	...	3	20	..	22	21	60	1	1	17	1	5	17	...	58	88	...	18
	Deaths	11	...	1						2						7			1									
2	Admissions ...	850	...	473	42	33	...	1	...	...	...	2	23	...	3	2	61	2	...	19	...	3	10	...	92	76	...	8
	Deaths	7		1						1							1	1										
3	Admissions ...	607	...	375	1	34	1	...	...	...	...	1	23	...	7	3	21	...	...	4	1	1	4	..	52	73	...	6
	Deaths	1					1								1	1	1											
4	Admissions ...	2,792	...	1,950	45	93	1	10	...	...	...	3	16	...	16	5	135	...	...	27	...	4	84	...	129	236	...	29†
	Deaths		...	7																								
5	Admissions ...	2,077	1	1,074	16	71	16	13	..	...	1	22	12	1	31	9	242	13	...	44	1	2	29	1	121	294	...	63‡
	Deaths										1						1											
6	Admissions ...	635	...	490	22	9	...	1	1	...	...	...	18	...	6	...	24	...	...	5	...	...	8	...	27	19	...	5
	Deaths	10		1					1																			
7	Admissions ...	857	...	425	10	34	...	1	..	...	2	12	13	...	8	...	50	11	1	18	..	7	16	..	97	130	...	12
	Deaths	1																										
8	A[illegible]ns ...	871	...	614	38	19	2	3	...	...	...	4	6	...	18	3	37	1	...	15	1	6	9	...	40	30	...	7
	Deaths	3																										
	Admissions ...	9,504	1	5,778	234	337	20	51	1	1	3	47	131	1	109	43	626	28	2	140	4	28	177	1	625	959	...	148
	Deaths						1		1		1			1					1							1		
the PUNJAB.																												
1	Admissions ...	403	...	230	10	16	..	1	...	1	...	1	18	...	12	3	20	...	...	10	...	1	2	2	29	47	...	9
	Deaths	2																										
2	Admissions ...	1,008	...	617	30	38	...	9	...	1	...	2	19	1	15	5	44	2	2	19	...	...	31	..	67	89	...	12
	Deaths	1														1												
3	Admissions ...	1,142	...	849	14	12	5	65	...	1	...	1	12	...	22	2	49	14	1	4	...	2	13	...	39	30	...	7
	Deaths						...	2	...							1												1
4	Admissions ...	784	...	290	23	41	...	7	...	...	...	5	23	...	35	36	39	11	1	21	1	3	46	...	179	11	...	12
	Deaths	12																								1		
5	Admissions ...	381	...	170	8	8	...	1	...	1	1	1	14	...	9	8	16	2	...	14	...	1	12	...	55	55	...	5
	Deaths										1																	
6	Admissions ...	537	...	260	6	20	1	...	...	1	...	3	16	1	12	8	29	5	1	8	...	...	9	...	123	8	...	16
	Deaths			4					...	1					1												...	
7	Admissions ...	367	...	184	20	5	...	11	...	...	...	...	22	...	6	2	25	1	2	1	..	5	5	2	28	35	...	13
	Deaths			1																								
8	Admissions ...	474	...	325	14	7	...	30	...	...	...	...	7	1	3	...	8	...	...	5	...	1	10	...	21	29	...	7
	Deaths													1			1											1
9	Admissions ...	630	...	410	10	33	3	1	...	2	...	1	21	...	5	3	20	10	2	14	1	...	5	...	43	34	...	4
	Deaths									1						1			1							1		
10	Admissions ...	495	...	205	6	31	...	7	1	...	1	4	4	...	7	2	15	5	...	25	...	2	2	...	39	120	...	19
	Deaths							1			1															1		2
11	Admissions ...	426	...	273	5	8	1	1	...	...	...	4	7	...	4	4	22	...	...	4	1	..	8	...	42	40	...	2
	Deaths	2		1																								
12	Admissions ...	818	...	411	21	13	6	20	1	...	...	1	13	1	23	31	67	16	...	5	1	5	13	1	82	73	...	14
	Deaths									1				1				...										1
13	Admissions ...	1,008	...	497	14	35	1	6	1	1	5	3	11	...	38	79	107	37	...	4	...	2	7	...	91	57	...	7
	Deaths			27												17		1								1		
14	Admissions ...	458	...	281	3	11	1	1	...	...	...	2	12	1	6	6	21	...	...	6	...	...	2	1	37	61	..	6
	Deaths	1		1																								
15	Admissions ...	800	...	441	9	14	...	13	...	...	...	15	19	1	15	8	111	2	1	36	...	3	6	...	66	26	...	12
	Deaths			1												2												
16	Admissions ...	632	...	383	11	19	2	11	...	2	...	4	14	...	6	21	36	...	...	32	...	...	12	2	39	21	...	7
	Deaths							1	...																	1		

occurred on the march, and eight soon after reaching Meerut.
opia.
opia
from service in Lower Bengal.
eleven deaths occurred at Peshâwur between this date and the end of the year,
contagious, with pneumonic complication.

	REGIMENTS AND STATION OF 1870.	Date of Arrival from Station previously occupied.	REGIMENTAL STRENGTH.		Admission-rate of 1870 per 1,000 of Strength.	INVALIDED.		DIED.		LOSS PER 1,000.	
			Number borne on the Rolls.	Average Strength present during 1870.		To their homes for change of air.	For Discharge.	With the Regiment.	Absent from the Regiment.	By Invaliding for Discharge.	By Deaths.
17	Sappers and Miners, 5th Company, Rawulpindee	... ...	100	96	1187·5	1	...	...	1	...	10·00
18	16th Bengal Cavalry, Rawulpindee, with Detachment of 130 men at Huzara ...	March 1868, from Morar ...	455	409	1802·0	8	8	6	...	17·58	13·19
19	24th Native Infantry, Rawulpindee, with Detachment of 80 men at Murree for 10 months	February 1868, from Peshawur ...	711	629	1906·5	13	4	11	3	5·62	19·69
20	20th Native Infantry, Tallagunge, with Detachment of 162 men at Attock for 8 months	February 1869, from Meean Meer	697	638	1365·2	2	5	...	1	7·17	1·43
21	23rd Native Infantry, Huzara	August 1868, from Abyssinia ...	702	634	971·7	5	...	5	2	...	9·97
22	5th Bengal Cavalry, Nowshera*	December 1868, from Seetapore ...	448	453	2200·0	15	10	10	6	35·71	35·71
23	31st Native Infantry, Nowshera*	November 1868, from Umballa ...	712	563	2513·3	6	2	10	4	2·81	19·66
24	Sappers and Miners, 2nd and 7th Companies, Peshawur	December 1868, from Roorkee ...	187	158	1481·0	9	3	3	2	16·04	26·74
25	15th Bengal Cavalry, Peshawur*	December 1869, from Mooltan ...	460	415	1919·4	7	3	4	3	6·52	15·22
26	18th Bengal Cavalry, Peshawur*	December 1867, from Rawulpindee	431	378	2759·3	13	10	11	5	23·20	37·12
27	15th Native Infantry, Peshawur*	December 1869, from Ferozepore...	712	637	3095·8	32	9	26	..	12·64	36·52
28	19th Native Infantry, Peshawur*	November 1868, from Allyghur ...	670	616	2281·1	26	10	7	3	14·93	14·93
29	25th Native Infantry, Peshawur*	January 1868, from Delhi	661	610	2063·9	16	9	23	11	13·62	51·44
30	36th Native Infantry, Peshawur*	December 1869, from Meerut ...	712	647	2817·6	32	12	14	4	16·85	25·28
	REGIMENTS OF THE PUNJAB	...	17,558	15,671	1588·5	346	275	298	93	15·66	22·27
	REGULAR NATIVE ARMY OF THE PRESIDENCY.	...	41,740	40,031	1189·5	839	715	632	237	15·98	19·13

6. REGIMENTS of

1	Huzara Mountain Train, Abbottabad ...	April 1867, from Kohat ...	177	146	2528·8	9	16	1	1	[illegible]	11·30
2	3rd Punjab Infantry, Abbottabad	December 1868, from Kohat ...	728	610	2905·6	46	11	6	6	15·11	16·48
3	5th Goorkhas, Abbottabad and Huzara District	Stationary	740	642	2719·6	...	20	7	4	27·03	14·86
4	Guide Corps, Murdan	Stationary	1,112	877	1837·8	18	16	10	2	14·39	10·79
5	Peshawur Mountain Train	March 1869, from Abbottabad ...	162	162	2073·4	15	7	2	1	43·21	18·52
6	4 Garrison Company, Kohat	Stationary	73	64	937·5	2	...	3	...	...	41·10
7	4th Punjab Cavalry, Kohat	March 1869, from Bunnoo ...	497	373	1656·8	15	11	4	1	22·13	10·06
8	1st Punjab Infantry, Kohat	December 1868, from Dera Ismael Khan	711	633	2203·7	22	14	9	7	19·69	22·50
9	2nd Punjab Infantry, Kohat	November 1868, from Abbottabad	660	633	2282·2	13	37	12	4	56·06	24·24
10	4th Punjab Infantry, Kohat	February 1869, from Dera Ismael Khan	716	597	2463·0	15	...	10	8	...	25·14
11	2 Field Battery, Bunnoo, (Edwardesabad)	December 1868, from Kohat ...	103	92	2086·1	4	3	2	...	29·13	19·42
12	1st Punjab Cavalry, Bunnoo	February 1869, from Dera Ismael Khan	474	376	2414·9	27	13	10	2	27·43	25·32
13	2nd Sikhs, Bunnoo	January 1869, from Dera Ghazee Khan	746	659	2168·4	10	2	11	4	2·68	20·11
14	4th Sikhs, Bunnoo	February 1869, from Dera Ghazee Khan	736	612	2508·6	16	8	22	6	10·87	38·04
15	3 Field Battery, Dera Ismael Khan ..	January 1869, from Bunnoo ...	105	86	1825·6	3	5	2	1	47·62	28·57
16	2nd Punjab Cavalry, Dera Ismael Khan ...	February 1869, from Dera Ghazee Khan	478	371	1452·6	9	12	1	5	25·10	12·55
17	1st Sikhs, Dera Ismael Khan ...	November 1868, from Kohat ...	736	625	1427·2	11	30	11	2	40·76	17·66
18	5th Punjab Infantry, Dera Ismael Khan ...	January 1869, from Bunnoo ...	743	623	1690·3	11	20	10	1	26·92	14·80
19	5th Punjab Cavalry, Dera Ghazee Khan ...	February 1869, from Rajanpore ...	492	400	2512·5	12	7	3	1	14·23	8·13
20	3rd Sikhs, Dera Ghazee Khan, with Detachment of 187 men at Rajanpore	December 1868, from Peshawur ...	740	712	1501,4	21	14	17	4	18·09	28·04

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* These Regiments furnished Detachments

† Killed

the PUNJAB,—(continued.)

	Total Admissions into Hospital, and Deaths in Hospital during the year.		Causes of Admissions into Hospital and of Deaths in Hospital during the Year.																								
			Cholera.	Fevers.	Venereal Affections.	Rheumatism.	Scurvy.	Anaemia and Debility.	Dropsy.	Phthisis pulmonalis.	Apoplexy and Sunstroke.	Neuralgic Affections.	Eye Disease.	Heart Disease.	Bronchitis and Asthma.	Pneumonia and Pleurisy.	Dysentery and Diarrhoea.	Spleen Disease.	Hepatitis.	Diseases of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Scabies and Skin Diseases.	Guinea-worm.	Abscess and Ulcer.	Injuries.	Punished.	All other Causes.
17	Admissions ...	114	...	60	3	4	1	3	...	...	...	1	1	...	1	...	13	1	...	2	...	...	3	...	6	8	...	1
	Deaths ...	0	...	...	...	...			...								...	...			...	...	...					
18	Admissions ...	737	...	493	7	21	3	23	...	...	...	13	9	...	38	15	57	5	1	12	...	...	...	...	14	32	...	10
	Deaths ...	6	...	2	...			1			...	...			2			...	...	...	...	...	...			...		1
19	Admissions ...	1,252	...	643	1	54	1	2	...	1	...	1	19	...	45	10	225	2	...	54	[illegible]	3	33	1	100	32	...	18
	Deaths ...	11	...	5	...		...			1	...	...			1	1	2	...							...	1		
20	Admissions ...	871	...	538	3	25	...	6	...	...	...	3	18	...	19	10	55	...	...	16	...	...	15	3	78	72	...	10
	Deaths ...	0									...									...	...				...			
21	Admissions ...	618	...	361	21	5	...	7	1	...	...	5	12	...	11	3	47	5	1	8	...	6	23	..	34	65	...	3
	Deaths ...	[illegible]		1		...										1	2			...		...						1
22	Admissions ...	907	...	609	5	44	...	...	...	1	..	...	9	...	14	1	195	...	1	2	...	1	7	...	43	59	...	6
	Deaths ...	10		[illegible]		...		...		1					1										...			
23	Admissions ...	1,415	...	1,154	6	7	...	27	...	...	...	2	10	...	16	6	45	7	1	21	...	...	5	...	34	67	...	7
	Deaths ...	10							...	...	...									...					...	1		
24	Admissions ...	231	...	113	5	12	...	18	...	...	1	5	1	...	9	4	32	9	...	8	...	...	1	...	3	7	...	6
	Deaths ...	[illegible]														1	1											
25	Admissions ...	800	...	550	9	10	...	2	2	..	...	1	31	...	5	8	91	3	...	11	...	3	...	4	25	35	...	13
	Deaths ...	1										...					1						...		...	...		
20	Admissions ...	1,043	...	685	17	12	...	50	..	...	...	7	12	1	16	12	62	4	...	13	1	1	5	1	38	99	...	7
	Deaths ...	11					...										1			...			...			2		
27	Admissions ...	1,972	...	1,189	13	23	...	14	...	2	2	4	18	...	19	18	140	412	...	4	...	1	7	...	63	35	...	8
	Deaths ...	[illegible]								1	1							1				...				2		...
28	Admissions ...	1,407	...	828	10	15	1	34	...	5	...	18	11	2	50	13	164	72	1	41	...	4	20	4	60	34	...	22
	Deaths ...	[illegible]													1							...						
20	Admissions ...	1,259	...	763	26	32	1	24	...	...	...	8	10	...	48	11	172	9	2	18	...	...	15	...	46	69	...	5
	Deaths ...	2																										1
30	Admissions ...	1,823	...	1,500	24	19	1	30	1	..	...	9	5	...	12	11	130	9	...	18	3	...	2	3	14	13	...	10
	Deaths ...	14							1																...			
	Admissions ...	24,893	...	15,323	380	603	28	430	7	19	10	124	398	9	514	340	2,047	643	17	436	9	45	321	24	1,530	1,363	...	278
	Deaths ...	[illegible]		[illegible]				[illegible]		[illegible]					1		[illegible]		1							[illegible]		1
	Admissions ...	59,625	50	33,392	1418	1790	107	688	21	79	20	344	985	21	1392	601	5,512	962	67	1,179	42	217	1,097	36	3,901	4,441	1	1202
	Deaths ...	[illegible]	[illegible]	[illegible]				7	[illegible]		[illegible]	[illegible]				[illegible]	[illegible]											3

the PUNJAB FRONTIER FORCE.

			Cholera.	Fevers.	Venereal Affections.	Rheumatism.	Scurvy.	Anaemia and Debility.	Dropsy.	Phthisis pulmonalis.	Apoplexy and Sunstroke.	Neuralgic Affections.	Eye Disease.	Heart Disease.	Bronchitis and Asthma.	Pneumonia and Pleurisy.	Dysentery and Diarrhoea.	Spleen Disease.	Hepatitis.	Diseases of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Scabies and Skin Diseases.	Guinea-worm.	Abscess and Ulcer.	Injuries.	Punished.	All other Causes.
1	Admissions ...	413	...	266	...	8	1	...	...	...	...	6	...	...	4	8	28	...	...	15	...	...	7	...	16	48	...	6
	Deaths	1															1											
2	Admissions ...	1,291	...	797	7	8	7	1	...	2	...	35	5	1	44	9	162	...	...	31	...	1	42	4	60	53	...	22
	Deaths	[illegible]		1		...																						
3	Admissions ...	1,746	...	1,328	5	33	1	...	...	...	1	5	83	...	21	13	97	...	2	24	...	2	11	...	57	90	10	13
	Deaths	[illegible]		1																								
4	Admissions ...	1,610	...	854	34	22	1	20	...	2	..	22	51	...	71	19	102	11	10	37	1	...	28	...	108	203	...	14
	Deaths ...	10								1	..				1					..								
5	Admissions ...	482	...	301	2	8	...	4	...	...	...	3	7	...	13	1	50	.	...	11	1	1	7	...	26	40	...	7
	Deaths	2																										
6	Admissions ...	60	...	28	1	7	..	...	...	...	...	2	1	...	...	...	1	1	...	4	...	...	2	1	6	4	...	2
	Death	3														...												
7	Admissions ...	618	...	338	7	15	...	6	2	...	...	7	9	..	6	10	54	6	...	16	1	1	7	.	53	70	...	10
	Deaths ...	1																							...	..		1
8	Admissions ...	1,395	...	1,011	17	19		12	...	1	1	...	8	...	13	21	97	3	...	26	...	...	27	5	76	52	...	6
	Deaths	[illegible]									1						1											
9	Admissions ...	1,413	...	986	9	30	1	10	...	1	...	1	9	...	13	7	123	10	..	18	...	1	40	3	58	50	...	25
	Deaths	[illegible]						1		1					1		1											1
10	Admissions ...	1,474	...	1,000	11	48	...	2	...	2	...	16	15	1	12	45	94	5	3	24	2	...	31	1	117	24	...	21
	Deaths	10		2										1		1										1		
11	Admissions ...	275	...	203	1	4	...	...	...	...	...	4	1	...	3	1	18	1	...	2	...	1	2	...	15	18	...	1
	Death	2																										1
12	Admissions ...	908	...	477	2	22	1	10	...	...	...	9	15	...	27	4	98	7	1	44	3	1	16	18	56	88	...	9
	Deaths	10					1								1													
13	Admissions ...	1,420	...	894	9	40	1	10	1	2	10	10	7	1	49	21	127	10	1	58	3	6	21	...	61	52	...	35
	Deaths	[illegible]						1		1	1	..																
14	Admissions ...	1,572	...	903	7	43	2	15	...	...	2	14	19	...	55	29	215	7	...	32	...	4	20	1	107	58	...	30
	Deaths	[illegible]		1							1				1													1
15	Admissions ...	157	...	62	8	7	...	1	...	...	...	...	8	...	2	...	20	...	...	4	...	...	1	...	20	23	...	1
	Death	[illegible]				..		1			...																	
16	Admissions ...	539	...	286	13	18	...	7	...	...	...	2	1	...	4	2	38	4	5	7	1	...	10	16	62	56	...	9
	Death	1								..	1																	
17	Admissions ...	892	...	535	14	29	1	10	1	1	3	2	15	...	13	11	93	9	2	9	2	...	15	3	85	33	...	6
	Deaths	[illegible]				...				1	1																	
18	Admissions ...	1,057	...	649	26	18	...	10	...	2	3	7	20	...	11	10	91	14	1	26	3	1	9	12	82	46	...	16
	Deaths	10	...	[illegible]						1			..															
19	Admissions ...	1,005	...	646	1	10	2	13	...	...	...	4	10	...	15	2	35	9	...	11	...	...	10	8	99	124	...	6
	Deaths	[illegible]													1	1												1
20	Admissions ...	1,069	...	657	18	38	3	5	...	...	..	9	20	...	91	15	73	5	1	32	1	1	14	3	74	57	...	14
	Deaths	17		4				1																				1

to the Frontier Outposts during the year.

In action

REGIMENTS of the

REGIMENTS AND STATION OF 1870.	Date of Arrival from Station previously occupied.	Regimental Strength. Number borne on the Rolls.	Regimental Strength. Average Strength present during 1870.	Admission-rate of 1870 per 1,000 of Strength	Invalided. To their homes for change of air.	Invalided. For Discharge.	Died. With the Regiment.	Died. Absent from the Regiment.	Loss per 1,000. By Invaliding for Discharge.	Loss per 1,000. By Deaths.
6th Punjab Infantry, Dera Ghazee Khan ...	January 1869, from Kohat ...	711	641	1583·5	11	16	6	3	21·59	10·80
3rd Punjab Cavalry, Rajanpore	January 1869, from Kohat ...	480	397	3239·3	19	8	5	4	16·67	18·75
Regiments of the Punjab Frontier Force ...		12,159	10,336	2100·0	339	270	164	66	22·21	18·92

REGIMENTS of the CENTRAL

1	Bhopal Battalion, Sehore*	933	816	1462·0	8	30	11	5	32·16	17·15
2	1st Central India Horse, Goonah†	480	320	230·2	2	6	4	1	12·50	10·42
3	2nd Central India Horse, Augur†	495	250	1072·0	3	3	3	...	6·06	6·06
4	Malwa Bheel Corps, Sirdarpore	560	405	886·2	1	...	6	1	...	12·50
5	Meywar Bheel Corps, Kherwarrah	704	648	1510·8	...	18	5	...	25·57	7·10
6	Erinpoorah Irregular Force	868	718	777·2	3	2	6	...	2·31	6·91
7	Deolee Irregular Force*	877	773	1657·2	10	6	9	1	6·84	11·40
	Regiments of the Central India Irregular Force ...	4,917	3,936	1200·0	27	65	44‡	8	13·22	10·58

* Including
† Head
‡ Of these deaths 15

STATEMENT SHOWING THE GAIN AND LOSS IN STRENGTH

Present with their Regiments on 1st January 1870	43,840
At their homes on Furlough	429
At their homes on Sick Leave	396
Remaining sick in the Hospitals of other Regiments	66
Total Strength on 1st January 1870 ...	44,731

Additions of the Year.

Transfers received from other Regiments	28
Recruits received during the year	3,738
Deserters rejoined	5
Total Gain ..	3,771

ANNUAL RELIEF OF THE

CAVALRY REGIMENTS.

9th Cavalry	From Meean Meer	To Rawul Pindee	Arrived	November 1870.
10th Cavalry	„ Rawulpindee	„ Peshawur	Arrived	October 1870.
18th Cavalry	„ Peshawur	„ Meean Meer	Arrived	November 1870.

INFANTRY REGIMENTS.

4th Native Infantry	From Allahabad	To Cachar and Frontier Outposts ...	Arrived	December 1870.
7th Native Infantry	„ Dacca and Cachar	„ Lucknow	Arrived	February 1871.

XVI,—(*concluded.*)

PUNJAB FRONTIER FORCE,—(concluded.)

	Total Admissions into Hospital and Deaths in Hospital during the year.		Causes of Admissions into Hospital and of Deaths in Hospital during the year.																									
			Cholera.	Fevers.	Venereal Affections.	Rheumatism.	Scurvy.	Anæmia and Debility.	Dropsy.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Neuralgic Affections.	Eye Diseases.	Heart Disease.	Bronchitis and Asthma.	Pneumonia and Pleurisy.	Dysentery and Diarrhœa.	Spleen Disease.	Hepatitis.	Diseases of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Scabies and Skin Diseases.	Guinea-worm.	Abscess and Ulcer.	Injuries.	Punished.	All other Causes.
	Admissions ...	1,015	...	600	15	35	4	4	...	1	1	3	15	...	22	22	83	1	...	18	...	1	9	2	62	44	...	10
	Deaths	6		2	...	...	...	...	...	1	...	...	...	...		2	1	...		...		...			...	...		
	Admissions ...	1,286	...	889	11	17	1	...	...	...	...	1	18	...	17	3	50	5	...	11	2	4	5	...	137	103	...	13
	Deaths	5		2		1	...	...		...	...			...	...	1		...	...		...		...			...	...	1
	Admissions ...	21,706	...	13,709	218	477	20	149	4	14	21	162	287	3	140	263	1,747	120	26	490	20	25	334	77	1,437	1,336	10	285
	Deaths	104	...	47		1	1	1	...	6	10	...	...	1	12	10	11	1	1	...	1	...	...	...	1	12		11

INDIA IRREGULAR FORCE.

			Cholera.	Fevers.	Venereal Affections.	Rheumatism.	Scurvy.	Anæmia and Debility.	Dropsy.	Phthisis Pulmonalis.	Apoplexy and Sunstroke.	Neuralgic Affections.	Eye Diseases.	Heart Disease.	Bronchitis and Asthma.	Pneumonia and Pleurisy.	Dysentery and Diarrhœa.	Spleen Disease.	Hepatitis.	Diseases of the Digestive System.	Diseases of the Urinary System.	Diseases of the Generative System.	Scabies and Skin Diseases.	Guinea-worm.	Abscess and Ulcer.	Injuries.	Punished.	All other Causes.
1	Admissions ...	1,193	...	715	28	40	1	20	...	...	...	17	39	1	29	13	131	4	3	19	4	...	12	...	56	43	...	18
	Deaths	11		4		...		1				...		1			1		...		1			...		2	...	1
2	Admissions ...	77	...	43	...	6	...	...	...	...	...	3	...	...	5	...	11	...	...	...	...	...	...	...	3	6	...	...
	Deaths	4	...	1	...	...						...	...		1		...				...	...	...	...	...	1		1
3	Admissions ...	268	1	139	11	10	...	...	...	...	...	...	7	...	...	2	14	4	2	2	...	2	3	13	25	25	...	8
	Deaths	3	...	1	...	...	...	...		...		...			...			...		...					...	1	...	1
4	Admissions ...	367	...	215	3	12	...	...	1	...	...	1	28	...	11	7	25	1	...	1	...	1	2	16	16	25	...	2
	Deaths	6	...	4	...					...	...	...	...				...	...		...		...		...	...	2	...	
5	Admissions ...	979	...	493	7	30	...	5	...	...	...	6	55	...	20	5	38	3	1	11	1	...	44	69	108	70	...	13
	Deaths	5	...	2	...			...				...	...			1	...		1						...	...		1
6	Admissions ...	558	...	261	80	10	...	4	...	2	...	2	38	...	...	5	18	2	...	17	1	2	6	13	36	56	...	5
	Deaths	6	...	2	...	...	...	...	...	...	...	...	...	...		1	2		...					...	...	1		
7	Admissions ...	1,281	...	760	62	38	...	1	1	...	1	...	27	...	19	14	41	4	...	31	1	12	14	24	69	146	...	16
	Deaths	9	...	5		...			...	...		...	...	...		2	1	...	...		...	...		...	...	1		
	Admissions ...	4,723	1	2,626	191	146	1	30	2	2	1	29	194	1	84	46	278	18	6	81	7	17	81	135	313	371	...	62
	Deaths ...	44	...	19	...		...	1	...	...	...	...	...	1	1	4	4	...	1		1				...	8	...	4

Detachments.
Quarters only.
occurred in Outposts.

OF THE REGULAR NATIVE ARMY OF BENGAL DURING 1870.

PERMANENT LOSS OF THE YEAR.

Deaths at Head-Quarters	570
Deaths at Outposts and in Detachments	62
Deaths while on Furlough, &c.	83
Deaths while at home on Sick Leave	154
Total Deaths... ...	869
Invalided for Discharge	715
Transfers given to other Regiments	34
Discharged otherwise	2,006
Desertions, struck off for bad conduct, &c....	375
Total Loss	3,999
Remaining on the Regimental Rolls on 31st December 1870	41,503

NATIVE ARMY, 1870-71.

INFANTRY REGIMENTS,—*continued.*

21st Native Infantry	From	Mecan Meer	To	Peshawur	...	Arrived	November 1870.
22nd Native Infantry, Head-Quarters and Left Wing.	„	Fort William	„	Dacca	...	Arrived	March 1871.
24th Native Infantry	„	Rawulpindee	„	Mecan Meer	...	Arrived	November 1870.
25th Native Infantry	„	Peshawur	„	Rawulpindee	...	Arrived	November 1870.
33rd Native Infantry	„	Morar	„	Allahabad	...	Arrived	November 1870.
34th Native Infantry	„	Lucknow	„	Morar	...	Arrived	November 1870.

NATIVE TROOPS, 1870.

XVII.

TABLE showing the SICKNESS and MORTALITY among the REGIMENTS of the MADRAS NATIVE ARMY serving in Stations of the BENGAL PRESIDENCY during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

(Stations occupied—Dorundah, Nagode, Banda, Nowgong, Jubbulpore and Saugor.)

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS IN HOSPITAL.																	Died out of Hospital.
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	
January ...	3,787	195	51·5	7	...	...	...	5	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...
February ...	3,763	156	41·5	4	...	...	...	1	1	...	...	1	...	...	...	...	1	...	...	...	...	...	...
March ...	3,745	125	33·4	4	...	...	...	...	2	...	...	...	...	...	1	...	...	...	...	...	...	1	...
April ...	3,688	97	26·3	4	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...
May ...	3,615	110	30·4	8	...	...	...	2	5	...	...	...	...	...	1	...	...	...	...	...	...	...	...
June ...	3,569	89	24·9	3	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	1	...
July ...	3,585	82	22·9	2	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1
August ...	3,505	115	32·8	4	...	...	...	...	1	...	...	1	...	...	1	1	...	...	...	...	...	...	...
September ...	3,519	155	44·0	2	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
October ...	3,535	153	43·3	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
November ...	3,608	210	58·2	4	...	...		1	1	1	...	...	...	...	1	...	...	...	...	...	...	...	...
December ...	3,660	203	55·5	4	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	3	...
						...	...	13	13	1	...	2	...	...	6	2	1	...	...	...	1	7	1
						Died per 1,000 of the Average Strength.																	
For the year ...	3,631	141	38·8	47	12·94	...	...	7·16		·28	...	·54	...	...	1·65	·54	·28	...	...	...	·28	1·93	·28

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Smallpox ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fever, Intermittent ..	155	116	126	134	191	110	155	217	278	341	490	235	2,544	700·6	·51
Fever, Remittent and Continued ...	1	2	6	2	9	5	1	3	2	4	3	2	40	11·0	32·50
Apoplexy ...	...	...	...	...	1	...	...	...	...	...	...	...	1	·3	...
Dysentery ...	7	6	2	3	5	3	...	4	4	5	6	2	47	12·9	2·15
Diarrhœa ...	3	4	3	1	2	1	2	11	5	4	6	4	46	12·7	
Hepatitis ..	...	...	...	...	...	...	...	...	...	1	...	...	1	·3	...
Spleen Disease ...	3	1	1	...	...	...	...	...	1	1	1	2	10	2·8	...
Respiratory Diseases ..	17	10	16	5	11	3	6	7	1	6	9	15	106	29·2	5·66
Phthisis Pulmonalis .	1	2	1	2	...	...	...	...	...	...	1	...	7	1·9	14·29
Dropsy ...	...	...	1	...	...	...	...	1	1	...	...	...	3	·8	...
Scurvy ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rheumatism .	16	14	20	15	11	3	15	19	9	7	30	23	182	50·1	1·06
Venereal Diseases . .	7	4	3	6	3	6	3	1	1	3	7	4	48	13·2	
Eye Diseases .	...	4	9	17	14	7	14	12	17	11	6	15	126	34·7	
Abscess and Ulcer .	19	27	23	9	28	13	14	23	16	19	20	30	245	67·5	
Wounds and Accidents	4	5	14	9	5	7	4	12	14	17	19	22	132	36·4	
All other Causes ..	10	13	16	16	15	11	14	23	15	17	21	37	208	57·3	
	243	208	241	209	290	175	228	333	364	436	628	391	3,746		
	Admitted per 1,000 of the Average Strength in each Month.														
	64·2	55·3	64·4	56·7	80·2	49·0	63·6	95·0	103·4	123·3	174·1	106·9	1031·7		

3. JAIL POPULATION, 1870.

JAILS OF THE BENGAL PRESIDENCY, 1870.

I.

TABLE showing the SICKNESS and MORTALITY among the JAIL POPULATION of the BENGAL PRESIDENCY during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS.																
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January	61,559	1,677	27·2	262	4·26	...	2	17	17	2	85	33	...	2	36	1	13	6	1	20	2	25
February	61,451	1,687	27·5	206	3·35	28	...	12	16	2	38	26	...	...	43	...	9	4	1	11	2	15
March	60,442	1,569	26·0	179	2·96	22	...	5	17	1	29	24	...	3	34	2	7	4	...	15	4	12
April	59,825	1,627	27·2	206	3·44	16	3	21	23	...	48	38	2	1	21	1	11	2	...	9	4	6
May	59,970	1,623	27·1	153	2·55	9	1	20	18	1	34	20	...	1	13	...	5	1	...	15	1	14
June	60,459	1,534	25·4	137	2·27	8	1	9	13	3	29	13	2	2	16	1	13	2	...	13	3	9
July	60,400	1,647	27·3	195	3·23	80	...	8	3	4	37	13	3	4	9	...	7	3	...	11	2	11
August	60,135	1,929	32·1	158	2·63	19	1	6	15	1	40	19	5	...	13	...	5	7	...	13	3	11
September	59,411	2,150	36·2	209	3·52	20	...	10	7	...	69	27	4	2	15	1	4	3	3	19	6	19
October	59,058	2,275	38·5	225	3·81	2	...	27	12	3	73	30	1	4	16	2	9	5	4	18	2	17
November	58,363	2,169	37·2	295	5·05	6	...	22	20	...	102	35	1	4	28	1	12	5	2	19	3	35
December	57,456	1,900	33·1	285	4·96	1	...	24	13	...	98	38	..	...	43	1	11	3	3	27	4	19
						211	8	181	173	17	682	316	18	23	287	10	106	45	14	190	36	193
						Died per 1,000 of the Average Strength.																
For the year	59,878	1,816	30·3	2,510*	41·92	3·52	·14	5·91		·28	16·67		·30	·39	4·79	·17	1·77	·75	·24	3·17	·60	3·22

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	10	108	52	40	21	21	184	50	46	5	7	2	546	9·1	38·64
Smallpox ...	16	16	11	13	11	4	1	1	1	...	1	...	75	1·3	10·67
Fever, Intermittent ...	1,486	1,307	1,302	1,008	1,805	1,553	2,005	3,022	3,782	4,373	2,875	1,825	6,983	450·6	·67
„ Remittent and Continued ...	58	91	86	126	94	86	56	70	92	129	105	63	1,057	17·7	16·37
Apoplexy ...	2	3	1	...	5	11	7	2	...	4	1	1	37	·6	46·00
Dysentery ...	441	300	367	435	376	373	544	704	626	593	646	572	5,970	99·8	8·94
Diarrhœa ...	361	338	482	578	479	441	483	478	435	354	410	351	5,188	86·6	
Hepatitis ...	8	1	2	2	6	1	14	10	7	8	2	5	64	1·1	28·12
Spleen Disease ...	44	40	39	35	52	29	34	41	35	34	62	45	490	8·2	4·69
Respiratory Diseases ...	282	339	258	157	188	132	137	109	129	141	174	263	2,307	38·5	12·44
Phthisis Pulmonalis .	39	13	25	20	20	20	16	15	10	22	38	49	287	4·8	36·93
Dropsy ...	12	5	7	6	6	9	12	12	8	11	10	9	107	1·8	42·06
Atrophy and Anæmia ...	67	39	49	39	54	65	44	46	36	45	76	102	661	11·0	28·74
Scurvy ...	7	10	6	9	6	5	4	12	27	31	11	11	139	2·3	10·07
Rheumatism ...	115	113	121	107	110	131	107	122	90	73	98	126	1,323	22·1	1·60
Venereal Diseases ...	88	95	85	99	117	95	86	100	69	72	70	62	1,038	17·3	
Eye Diseases ...	39	44	40	68	81	95	62	92	77	60	44	27	738	12·3	
Abscess and Ulcer ...	446	364	381	358	390	553	532	479	360	383	378	357	4,981	83·2	
Wounds and Accidents .	132	162	200	197	189	184	198	167	166	140	143	129	2,001	33·4	
All other Causes .	401	376	517	423	467	422	487	419	369	329	323	297	4,830	80·7	
	4,020	3,767	4,098	4,320	4,480	4,230	5,013	5,950	6,364	6,807	5,478	4,296	58,823		
	Admitted per 1,000 of the Average Strength in each Month.														
	65·3	61·3	67·8	72·2	74·7	70·0	83·0	98·9	107·1	115·3	93·9	74·8	982·4		

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* In addition to the deaths here recorded, 14 deaths from accidents out of Hospital, which were not entered in the Monthly Returns, occurred during the year including these deaths the death-rate of the year is 42·15 per 1,000.

JAILS OF THE BENGAL PRESIDENCY, 1870.

II.

TABLE showing the SICKNESS and MORTALITY among the JAIL POPULATION in LOWER BENGAL and in ASSAM during the Year 1870, *and the prevalence of the principal Diseases in each Month of the Year.*

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths.																
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January ...	14,377	460	32·0	56	...	...	2	1	1	...	11	6	...	1	6	...	4	3	...	8	1	9
February ...	14,508	454	31·3	38	...	...	...	1	2	2	8	3	...	...	5	...	4	4	..	2	1	6
March ...	14,436	472	32·7	72	...	18	...	1	4	...	13	6	...	2	9	2	3	1	..	9	3	4
April ...	14,241	477	33·5	51	...	14	3	3	4	...	10	4	...	1	4	1	5	...	..	1	..	1
May ...	14,457	497	34·4	40	...	6	...	...	4	...	14	2		1	2	.	1	1	.	3	1	5
June ...	14,444	515	35·7	36	...	6	...	...	2	..	11	1	1	1	3	..	4	1	...	2	...	4
July ...	14,412	568	39·4	70	...	41	...	...	1	..	8	5		2			4	1	...	7	...	1
August ...	14,180	612	43·2	54	...	7	...	4	3	...	13	6	2		3	...	3	2	.	5	...	6
September ...	13,899	583	41·9	64	...	20	...	3	2	...	10	10	3		1	.	..	..		6	2	7
October ...	13,663	537	39·3	52	...	2	...	3	3	1	19	5		2	2	.	2	2	.	5	..	6
November ...	13,572	613	45·2	77	...	6	...	3	2	...	27	5	..	2	8	1	4	2	..	3	1	13
December ...	13,531	553	40·9	48	..	1	...	3	2	..	12	9		..	6	..	6	...	...	5	1	3
						121	5	22	30	3	156	62	6	12	49	4	40	17	..	56	10	65
						Died per 1,000 of the Average Strength.																
For the year ..	14,143	528	37·3	658	46·52	8·56	·35	3·68		·21	15·41		·42	·85	3·46	·28	2·83	1·20	...	3·96	·71	4·60

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	9	14	40	32	18	18	78	14	46	5	7	2	283	20·0	42·75
Smallpox ...	3	...	5	7	4	1	...	...	...	...	...	...	20	1·4	25·00
Fever, Intermittent ...	506	428	472	448	501	448	594	828	643	739	830	646	7,083	500·8	·31
„ Remittent and Continued ...	6	15	13	16	16	7	15	9	8	12	12	10	139	9·8	21·58
Apoplexy ...	...	2	...	...	...	...	...	...	...	1	...	...	3	·2	100·00
Dysentery ...	109	92	128	141	153	108	237	260	184	183	188	147	1,990	140·7	5·80
Diarrhœa ...	77	85	167	172	172	218	182	157	206	124	131	81	1,772	125·3	
Hepatitis ...	2	...	2	1	3	1	8	4	4	2	1	4	32	2·2	18·75
Spleen Disease ...	16	22	22	18	34	13	23	18	14	17	30	17	244	17·3	4·92
Respiratory Diseases ...	53	64	62	31	67	33	29	31	52	42	47	97	608	43·0	8·06
Phthisis Pulmonalis ...	14	5	13	12	7	5	11	4	7	9	19	19	125	8·8	32·00
Dropsy ...	5	1	...	3	3	3	6	5	4	2	4	2	38	2·7	44·74
Atrophy and Anæmia ...	25	19	21	10	20	33	25	18	14	16	23	20	244	17·3	22·95
Scurvy ...	2	1	...	3	2	3	...	4	2	8	2	1	28	2·0	...
Rheumatism ..	38	35	38	44	42	51	36	40	27	25	31	40	456	32·2	1·95
Venereal Diseases ...	18	31	21	31	34	28	26	31	11	18	21	18	288	20·4	
Eye Diseases ...	10	8	11	10	8	10	15	23	15	12	14	5	141	10·0	
Abscess and Ulcer ...	53	52	52	48	55	81	50	60	53	42	38	59	648	45·8	
Wounds and Accidents...	32	39	52	51	44	57	51	54	45	41	51	47	564	39·9	
All other Causes ...	[illegible]7	156	208	166	170	195	202	157	165	140	138	127	1,960	138·6	
	1,104	1,069	1,327	1,244	1,362	1,373	1,594	1,717	1,500	1,438	1,587	1,351	16,066		
	Admitted per 1,000 of the Average Strength in each Month.														
	76·8	73·7	91·9	87·4	94·2	95·1	110·6	121·1	107·9	105·2	116·9	99·9	1178·4		

JAILS OF THE BENGAL PRESIDENCY, 1870.

III.

TABLE showing the SICKNESS and MORTALITY among the JAIL POPULATION in CHOTA NAGPORE, and in the DINAPORE, BENARES, OUDE, & CAWNPORE DISTRICTS during the Year 1870, & the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Disease.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January ...	21,491	482	22·4	73	...	...	...	...	3	1	33	14	...	...	3	1	7	2	..	5	1	3
February ...	21,152	480	22·7	83	...	28	...	1	4	...	16	15	...	...	4	...	4	...	1	6	...	4
March ...	20,652	473	22·9	50	...	4	..	...	3	...	14	13	...	...	2	...	4	2	...	8	1	4
April ...	20,072	522	26·0	67	...	2	...	3	5	...	32	30	1	...	2	...	4	1	...	5	1	1
May ...	19,723	472	23·9	49	...	2	1	5	2	1	13	9	...	..	3	...	3	...	...	6	...	4
June ...	19,801	398	20·1	43	...	2	1	2	3	1	8	8	1	...	4	...	7	1	...	2	2	1
July ...	19,709	468	23·7	72	...	30	...	2	...	...	13	5	1	1	4	...	1	1	...	2	...	3
August ...	19,361	521	26·9	53	...	12	1	1	6	1	11	5	1	...	2	...	1	5	...	5	2	...
September ...	18,997	547	28·8	40	...	...	...	...	2	...	26	3	...	2	3	...	2	...	1	4	2	4
October ...	18,816	667	35 4	65	..	..	...	5	2	1	25	12	..	1	2	2	2	1	...	6	1	5
November ...	18,729	647	34·6	80	...	...	..	3	3	...	25	11	...	...	7	...	6	2	...	10	...	13
December ...	18,578	576	31·0	83	...	..	...	5	1	...	35	10	...	...	9	1	3	1	1	12	1	4
						89	3	27	31	5	251	135	4	4	45	4	44	10	3	66	11	46
						Died per 1,000 of the Average Strength.																
For the year ...	19,757	521	26·4	787	39·83	4·50	·15	3·00		·25	10·54		·20	·20	2·28	·20	2·23	·81	·15	3·34	·56	2·38

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH. Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
Cholera ...	1	94	12	8	2	3	106	36	...	...	...	...	262	13·3	33·97
Smallpox ...	13	16	5	6	7	3	1	1	1	...	1	..	54	2·7	5·56
Fever, Intermittent ...	260	247	339	436	401	383	504	618	877	1,212	624	410	6,566	332·3	·41
" Remittent and Continued ...	16	23	10	36	16	18	11	24	21	48	34	5	268	13 6	12·69
Apoplexy ...	1	...	...	...	2	3	...	1	...	1	1	1	10	·5	50·00
Dysentery ...	175	109	159	183	111	84	169	229	193	197	208	209	2,026	102·5	10·09
Diarrhœa ...	140	188	209	285	155	112	159	141	96	105	144	118	1,802	91·2	
Hepatitis ...	1	...	...	1	2	...	...	2	...	...	1	...	7	·3	57·14
Spleen Disease ...	9	6	6	5	9	6	9	12	6	7	10	13	104	5·3	3·85
Respiratory Diseases ...	44	41	48	32	27	20	24	18	21	36	35	35	381	19·3	11·81
Phthisis Pulmonalis ...	20	5	8	5	6	9	3	7	2	7	13	22	107	5·4	41·12
Dropsy ...	6	3	5	1	3	4	4	5	...	5	4	1	41	2·1	39·03
Atrophy and Anæmia ...	20	10	19	12	16	22	11	16	13	17	33	54	243	12·3	27·16
Scurvy ...		2	1	1	...	...	1	2	5	16	2	3	33	1·7	9·09
Rheumatism ...	29	35	33	18	23	23	28	22	30	14	24	29	308	15·6	1·47
Venereal Diseases ...	31	31	25	22	20	25	20	29	26	24	21	30	313	15·7	
Eye Diseases ...	11	18	10	18	29	15	18	25	19	19	16	8	201	10·2	
Abscess and Ulcer ...	133	118	137	135	129	198	185	130	108	114	134	135	1,665	84·3	
Wounds and Accidents...	48	54	71	77	52	59	50	52	55	57	42	39	665	33·7	
All other Causes ...	103	83	108	84	99	73	95	80	60	63	77	60	1,003	50·8	
	1,057	1,083	1,211	1,364	1,178	1,060	1,402	1,450	1,542	1,942	1,680	1,181	16,059		
	Admitted per 1,000 of the Average Strength in each Month.														
	49·2	48·8	58·6	67·9	59·7	53·5	71·1	75·4	81·2	103·2	87·0	63·6	812·8		

JAILS OF THE BENGAL PRESIDENCY, 1870.

IV.

TABLE showing the SICKNESS and MORTALITY among the JAIL POPULATION in the CENTRAL PROVINCES, excluding JUBBULPORE and SAUGOR, during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths.																
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January ...	2,411	86	35·7	6	...	...	...	...	...	...	2	1	...	...	...	...	...	...	...	1	...	2
February ...	2,366	81	34·2	3	...	...	...	...	...	..	1	1	...	.	...	...	...	...	...	...	...	1
March ...	2,306	70	30·3	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...
April ...	2,303	64	27·8	5	...	...	...	...	2	...	...	1	...	..	..	.	1	...	...	...	1	...
May ...	2,319	77	33·2	2	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1
June ..	2,260	78	34·5	7	...	...	...	...	...	1	3	...	...	...	1	1	..	...	..	1	...	...
July ...	2,166	79	36·5	2	...	...	...	...	...	...	1	...	...	...	...	..	...	...	...	...	...	1
August ..	2,176	100	46·0	12	...	...	..	...	...	...	1	4	1	..	2	...	...	..	..	1	...	3
September ...	2,114	115	54·4	14	...	...	..	..	..	...	4	3	...	...	2	..	...	...	2	1	...	2
October ...	2,131	129	60·5	9	...	...	...	...	1	...	2	1	...	...	1	...	...	...	4	...	...	...
November ...	2,101	129	61·4	9	...	...	...	...	3	...	2	...	.	...	..	...	...	...	2	2	..	...
December ...	2,075	133	64·1	14	...	...	...	...	1	..	3	1	...	...	3	..	...	...	2	...	1	3
						...	..	1	7	1	19	12	1	...	9	1	1	...	10	6	2	13
						Died per 1,000 of the Average Strength.																
For the year ...	2,227	95	42·7	83	37·27	...	...	3·59		·45	13·92		·45	...	4·04	·45	·45	...	4·49	2·69	·90	5·84

CAUSES OF ADMISSION.	Number of Admissions into Hospital in each Month.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Smallpox ...	..	...	..	...	..	..	...	...	...	..	...	..	...	...	...
Fever, Intermittent .	82	63	77	87	79	61	92	154	191	226	171	164	1,450	651·1	·07
" Remittent and Continued ...	...	2	...	5	3	4	3	3	1	3	10	2	36	16·2	19·44
Apoplexy ...	.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dysentery ...	24	9	8	11	13	11	15	24	15	23	29	12	194	87·1	8·20
Diarrhœa ...	18	10	4	16	13	8	24	24	21	15	14	17	184	82·6	
Hepatitis ...	...	...	...	...	...	...	1	...	...	..	..	..	1	·5	...
Spleen Disease ...	3	...	...	2	1	...	...	1	1	3	1	2	14	6·3	...
Respiratory Diseases ...	13	6	7	5	11	6	11	9	8	13	17	15	121	54·3	7·44
Phthisis Pulmonalis ...	1	...	1	...	...	...	...	...	...	...	1	...	3	1·3	33·33
Dropsy ...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...
Atrophy and Anæmia ...	1	...	2	...	...	1	...	1	2	3	1	1	12	5·4	50·00
Scurvy ...	...	...	...	2	...	...	2	...	6	2	3	2	17	7·6	58·82
Rheumatism ...	10	9	7	7	16	14	20	23	13	13	13	11	156	70·0	1·48
Venereal Diseases ...	3	8	4	7	10	8	3	7	6	4	5	...	65	29·2	
Eye Diseases ...	3	...	2	2	2	6	5	3	5	2	...	...	30	13·5	
Abscess and Ulcer ...	[illegible]	40	20	32	57	75	51	38	30	47	50	41	538	241·6	
Wounds and Accidents ...	[illegible]	7	7	11	14	7	12	5	8	5	5	9	96	43·1	
All other Causes ...	[illegible]	16	18	12	18	12	13	19	16	12	18	18	195	87·6	
	232	170	163	199	237	213	252	311	326	371	344	294	3,112		
	Admitted per 1,000 of the Average Strength in each Month.														
	96·2	71·9	70·7	86·4	102·2	94·3	116·4	142·9	154·2	174·1	163·7	141·7	1397·4		

JAILS OF THE BENGAL PRESIDENCY, 1870.

V.

TABLE showing the SICKNESS and MORTALITY among the JAIL POPULATION in the AGRA DISTRICT, and in CENTRAL INDIA, during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS.																
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January ...	4,246	185	43·6	26	...	...	...	..	2	1	14	3	.	...	2	..	...	1	..	1	..	2
February ...	4,324	160	37·0	14	.	...	.	1	1	..	6	...	..	...	4	...	...	...	.	1	...	1
March ..	4,203	146	34·7	11	...	...	...	...	..	...	3	2	..	.	4	...	..	1	...	1	..	...
April ..	4,157	150	36·1	9	..	...	..	...	1	...	2	1	1	...	.	..	...	..	.	...	1	3
May ..	4,165	144	34·6	6	...	1	.	.		.	2	...	.		3	...	...	...	...	...	...	...
June ..	4,178	147	35·2	7	..	..	...	..	1	.	1	2	.	1	1	..	...	..		...	...	1
July .	4,260	147	34·6	13	..	...	...	...		.	4	...	1	1	2	.	1	...	.	1	1	2
August ..	4,312	165	38·3	6	...	...	.	...	1		2	.	1	...	1	..	1	.			...	...
September ...	4,194	184	43·9	6	...	...	.	..	1	..	...	.	..	.	2	.	...	1	.	1	.	1
October ..	4,094	168	41·0	16	..	...	..	...	1	...	5	2	1	.	4		...	1	.	1	...	1
November ...	3,894	153	39·3	11	...	...	.	...	1		3	2	.	2	1	.	...	...		1	...	1
December ..	3,770	130	34·4	15	...	...	.	2	1	..	4	1			3	.	...	...	.	1	1	2
						1	.	3	10	1	46	13	1	4	27	...	2	4		8	3	14
						Died per 1,000 of the Average Strength.																
For the year .	4,150	157	37·8	140	33·73	·24	...	3·13		·24	11·22		·96	·96	6·51	...	·49	·96	.	1·93	·72	3·37

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ...	...	.	..	...	1	...	...	...	...	...	...	...	1	·2	...
Smallpox .	..	..		..	.	...	...	...	..	...	..	.	...	...	...
Fever, Intermittent ...	106	88	66	107	102	94	100	122	146	109	142	66	1,338	322·4	·22
„ Remittent and Continued ...	7	13	11	11	13	14	5	12	15	15	6	1	123	29·6	8·13
Apoplexy ...	1	1	...	...	3	6	...	...	...	...	...	..	11	2·7	9·09
Dysentery ...	46	29	29	37	30	41	53	62	41	32	30	43	473	114·0	7·87
Diarrhœa ...	21	18	22	38	31	27	35	24	8	12	23	18	277	66·8	
Hepatitis ..	1	...	...	...	1	...	3	4	2	2	..	...	13	3·1	30·77
Spleen Disease ...	6	3	3	1	3	3	..	3	3	3	4	2	34	8·2	11·76
Respiratory Diseases ...	24	34	24	25	45	36	36	27	12	10	16	17	306	73·7	8·82
Phthisis Pulmonalis ...	...	1	..	1	4	...	1	2	...	...	1	1	11	2·7	18·18
Dropsy .	1	1	1	1	...	1	...	...	..	1	...	.	6	1·5	66·67
Atrophy and Anæmia ...	6	1	2	3	1	...	...	.	..	1	2	2	18	4·3	44·44
Scurvy ...	2	5	1	2	1		1	4	13	2	..	...	31	7·5	...
Rheumatism ...	13	14	18	12	18	15	9	16	8	4	4	7	138	33·3	1·29
Venereal Diseases ...	7	8	7	8	10	13	11	13	5	5	4	5	96	23·1	
Eye Diseases ...	3	1	6	6	3	3	...	7	5	3	2	2	41	9·9	
Abscess and Ulcer ...	53	28	41	20	35	49	34	49	62	65	38	34	516	124·3	
Wounds and Accidents ...	12	16	21	12	18	17	19	10	9	5	15	5	159	38·3	
All other Causes ..	26	25	40	31	31	32	48	32	34	28	19	22	371	89·4	
	335	286	295	327	346	351	355	387	363	387	306	225	3,963		
	Admitted per 1,000 of the Average Strength in each Month.														
	78·9	66·1	70·2	78·7	83·1	84·1	83·5	89·7	86·6	94·5	78·6	59·5	955·0		

JAILS OF THE BENGAL PRESIDENCY, 1870.

VI.

TABLE showing the SICKNESS and MORTALITY among the JAIL POPULATION in the ROHILCUND and MEERUT DISTRICTS during the Year 1870, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	Causes of Deaths. Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January ...	7,122	124	17·4	41	...	...		1	8		12	6			7	...	...	...		2	...	5
February ...	6,991	122	17·4	15	...	...			6		5	1	...	...		...	...	...	...	2	...	1
March ...	6,695	128	19·1	12	...	...		1	6	1	1	1				...				1		1
April ...	6,888	116	16·8	14	...			1	7		1	1			1	...	...	1		2		...
May ...	6,979	132	18·9	23		...	...	2	7		2	4		...			1	...		6	...	1
June ...	7,001	128	18·3	28	...			2	4	...	6	1	...		3		1		...	8	1	2
July ...	6,920	120	17·3	16	...	...	...		1		9	2			2		...	1		1	...	...
August ...	6,874	192	27·9	18	...				2		9	2			3				...	1	...	1
September ...	6,823	233	34·1	45	...		...		2		20	7		...	3	1	1	1		6	1	3
October ...	6,696	238	35·5	46	...			...	5	1	19	7		1	4		3			5	...	1
November ...	6,531	232	35·5	66	...	...	...	3	6		29	14			7		1			3	...	3
December ...	6,271	223	35·6	58	...	...		4	2	...	31	10		...	1	...	1	1		6		2
						...		14	56	2	144	56		1	31	1	8	4		43	2	20
						Died per 1,000 of the Average Strength.																
For the year ...	6,816	166	24·4	382	56·04			10·27		·29	29·34			·15	4·55	·15	1·18	·59		6·31	·29	2·93

CAUSES OF ADMISSIONS.	Number of Admissions into Hospital in each Month. Jan.	Feb.	March.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated
Cholera ...	...	...				...	...	...						..	...
Smallpox ...			1					...			...	...	1	·1	...
Fever Intermittent ...	92	123	109	133	155	107	154	331	359	424	164	154	2,311	339·1	·61
„ Remittent and Continued ...	24	37	38	43	24	16	2	11	27	31	21	13	287	42·1	19·51
Apoplexy ...	...	...	1		...	...	...	...	...	2			3	·4	66·67
Dysentery ...	23	18	9	10	22	17	29	52	86	57	87	94	504	73·9	20·60
Diarrhœa ...	44	33	23	25	35	32	28	60	46	30	50	61	467	68·5	
Hepatitis ...	1	...					1			1		1	4	·6	...
Spleen Disease ...	1	3	2	3			...		2	1	3	4	19	2·8	5·26
Respiratory Diseases ...	18	5	11	4	17	17	13	10	11	16	12	14	148	21·7	20·95
Phthisis Pulmonalis ...	1	...	1	1	2	1	...	...	1	4	1	2	14	2·1	57·14
Dropsy ...		...	1	1	...	...	1	1	...	2	1	3	10	1·5	40·00
Atrophy and Anæmia ...	6	5	2	10	13	5	7	5	5	8	14	18	98	14·4	43·88
Scurvy ...		1	...				...		...	1	1	1	4	·6	...
Rheumatism ...	7	3	11	12	6	6	3	4	6	5	6	11	80	11·7	1·59
Venereal Diseases ...	7	7	9	8	8	10	16	14	9	10	13	4	115	16·9	
Eye Diseases ...	5	5	11	8	16	10	9	15	12	11	8	9	119	17·5	
Abscess and Ulcer ...	63	68	45	34	40	70	67	66	46	55	54	36	638	93·6	
Wounds and Accidents ...	15	16	19	21	25	13	28	15	22	11	11	8	204	29·9	
All other Causes ...	24	17	21	24	34	22	21	27	26	26	22	23	290	42·5	
	331	331	315	337	406	326	379	614	658	695	468	456	5,316		
	Admitted per 1,000 of the Average Strength in each Month.														
	46·5	47·3	47·1	48·9	58·2	46·6	54·8	89·3	96·4	103·8	71·7	72·7	779·9		

JAILS OF THE BENGAL PRESIDENCY, 1870.

VII.

TABLE showing the SICKNESS and MORTALITY among the JAIL POPULATION in the PUNJAB during the Year 1870, *and the prevalence of the principal Diseases in each Month of the Year.*

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per 1,000 of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS.																
						Cholera.	Smallpox.	Fever, Intermittent.	Fever, Remittent and Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January ...	11,913	340	28·5	60	...	...	...	15	3	...	10	3	...	1	18	...	2	...	1	3	...	4
February ...	12,110	390	32·2	53	...	...	...	9	2	...	2	6	...	...	30	...	1	...	...	...	1	2
March ...	12,150	280	23·0	34	..	...	...	3	4	...	1	2	...	1	19	...	...	...	...	1	..	3
April ...	12,164	298	24·5	40	...	.	...	14	4	..	3	1	...	...	14	...	1	...	...	1	1	1
May ...	12,327	301	24·4	33	...	...	...	12	5	...	3	5	..	...	5	...	...	...	...	...	...	3
June ..	12,775	268	21·0	16	...	..	...	5	3	1	...	1	...	...	4	...	1	...	..	...	...	1
July ...	12,943	265	20·5	22	...	...	...	6	1	4	2	1	1	...	1	...	1	...	...	...	1	4
August ...	13,232	339	25·6	15	...	..	...	1	3	...	4	2	...	...	2	...	...	...	...	1	1	1
September ...	13,384	488	36·5	31	...	...	...	7	...	...	9	4	1	...	4	...	1	1	...	1	1	2
October ...	13,668	536	39·2	37	..	..	...	19	...	...	3	3	...	...	3	...	2	1	...	1	1	4
November ...	13,637	395	29·2	52	...	...	...	13	5	...	16	3	1	...	5	...	1	1	...	...	2	5
December ...	13,222	285	21·6	67	.	...	...	10	6	...	13	7	..	...	21	...	1	1	...	3	..	5
						...	...	114	36	5	66	38	3	2	126	...	11	4	1	11	8	35
						Died per 1,000 of the Average Strength.																
For the year ...	12,785	349	27·3	460	35·98	...	...	11·73		·39	8·14		·24	·16	9·85	...	·86	·31	·08	·86	·62	2·74

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admitted during the Year.	Admitted per 1,000 of Strength.	Died out of each hundred treated.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera ..	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...
Smallpox ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fever, Intermittent ...	421	358	290	398	504	460	561	966	1,563	1,573	744	385	8,235	644·1	1·38
,, Remittent and Continued ...	3	4	8	15	22	27	20	11	20	20	22	32	204	16·0	17·65
Apoplexy ...	...	...	...	...	...	2	7	1	...	...	...	...	10	·8	50·00
Dysentery ...	64	43	34	53	47	52	41	77	106	101	104	67	789	61·7	7·06
Diarrhœa ...	51	54	57	42	73	44	55	72	58	68	54	56	684	53·5	
Hepatitis ...	1	1	...	...	...	...	1	...	1	3	...	...	7	·6	42·86
Spleen Disease ...	9	6	6	6	5	7	2	7	9	3	8	7	75	5·9	2·67
Respiratory Diseases ...	130	189	104	60	21	20	24	14	25	24	47	85	743	58·1	16·96
Phthisis Pulmonalis ...	3	2	2	1	1	5	1	2	...	2	3	5	27	2·1	40·74
Dropsy ...	...	...	...	...	...	1	1	1	4	1	1	3	12	·9	33·33
Atrophy and Anæmia ...	9	4	3	4	4	4	1	5	2	...	3	7	46	3·6	23·91
Scurvy ...	3	1	4	1	3	2	...	2	1	2	3	4	26	2·0	3·85
Rheumatism ...	18	17	14	14	14	22	11	17	6	12	18	19	182	14·2	1·57
Venereal Diseases ..	22	10	19	23	26	11	10	6	12	11	6	5	161	12·6	
Eye Diseases ...	7	12	9	24	23	51	20	19	21	13	4	8	206	16·1	
Abscess and Ulcer ...	100	68	79	80	72	80	139	127	61	60	58	52	976	76·3	
Wounds and Accidents	19	30	30	25	30	31	29	31	27	21	19	21	313	24·5	
All other Causes ...	98	79	119	103	106	88	108	104	50	60	49	38	1,011	79·1	
	961	878	787	849	951	907	1,031	1,462	1,975	1,974	1,143	789	13,707		
	Admitted per 1,000 of the Average Strength in each Month.														
	80·7	72·5	64·8	69·8	77·2	71·0	79·7	110·5	147·6	144·6	84·4	59·7	1072·1		

.JAILS OF THE BENGAL PRESIDENCY, 1870.

VIII.

COMPARATIVE STATEMENT of the RATIOS of SICKNESS and MORTALITY among the JAIL POPULATION of the various PROVINCES of the BENGAL PRESIDENCY.

DISEASES.	BENGAL PROPER AND ASSAM.			CHOTA NAGPORE, BEHAR PROVINCES, BENARES, OUDE, AND CAWNPORE.			CENTRAL PROVINCES. (EXCLUDING SAUGOR AND JUBBULPORE.)			AGRA AND CENTRAL INDIA.			ROHILCUND AND MEERUT.			PUNJAB.			BENGAL PRESIDENCY.		
	Average Strength ... 14,143 Daily Sick-rate per 1,000 37·3 Admission-rate per 1,000 1178·4 Death-rate per 1,000— A. Cholera 8·56 B. All Causes 46·32			Average Strength ... 19,757 Daily Sick-rate per 1,000 26·4 Admission-rate per 1,000 812·8 Death-rate per 1,000— A. Cholera 4·52 B. All Causes 33·53			Average Strength ... 2,227 Daily Sick-rate per 1,000 42·7 Admission-rate per 1,000 1397·4 Death-rate per 1,000— A. Cholera .. B. All Causes 37·27			Average Strength ... 4,150 Daily Sick-rate per 1,000 37·8 Admission-rate per 1,000 955·0 Death-rate per 1,000— A. Cholera ... ·24 B. All Causes 33·73			Average Strength ... 6,816 Daily Sick-rate per 1,000 24·4 Admission-rate per 1,000 779·9 Death-rate per 1,000— A. Cholera B. All Causes 56·04			Average Strength ... 12,785 Daily Sick-rate per 1,000 27·3 Admission-rate per 1,000 1072·1 Death-rate per 1,000— A. Cholera ... B. All Causes 35·98			Average Strength ... 59,878 Daily Sick-rate per 1,000 30·3 Admission-rate per 1,000 982·4 Death-rate per 1,000— A. Cholera ... 3·52 B. All Causes ... 41·92		
	Admission-rate per 1,000.	Died out of each hundred treated.	Death-rate per 1,000.	Admission-rate per 1,000.	Died out of each hundred treated.	Death-rate per 1,000.	Admission-rate per 1,000.	Died out of each hundred treated.	Death-rate per 1,000.	Admission-rate per 1,000.	Died out of each hundred treated.	Death-rate per 1,000.	Admission-rate per 1,000.	Died out of each hundred treated.	Death-rate per 1,000.	Admission-rate per 1,000.	Died out of each hundred treated.	Death-rate per 1,000.	Admission-rate per 1,000.	Died out of each hundred treated.	Death-rate per 1,000.
Cholera ...	20·0	42·75	8·56	13·3	33·97	4·52	...	...		·2	...	·24	...	...		...	...		9·1	38·64	3·52
Smallpox ..	1·4	25·00	·35	2·7	5·56	·15	...	...		...	...		·1	...		...	...		1·3	10·67	·14
Fevers ...	510·6	·72	3·68	345·9	·89	3·08	667·3	·54	3·60	352·0	·89	3·13	381·2	2·70	10·27	660·1	1·78	11·75	468·3	1·26	5·91
Apoplexy ...	·2	...	·21	·5	50·00	·25	...	...	·45	2·7	9·09	·24	·4	66·67	·29	·8	50·00	·39	·6	46·00	·28
Dysentery and Diarrhœa ...	266·0	5·90	15·41	193·7	10·09	19·54	169·7	8·20	13·92	190·8	7·87	15·02	142·4	20·60	29·34	115·2	7·06	8·14	186·4	8·94	16·67
Hepatitis ...	2·2	18·75	·42	·3	57·14	·17	·5	...	·45	3·1	30·77	·96	·6	...		·6	42·86	·24	1·1	28·12	·40
Spleen Disease ...	17·3	4·92	·85	6·3	3·85	·24	6·3	...		8·2	11·76	·96	2·9	5·26	·15	5·9	2·67	·16	8·2	4·69	·39
Respiratory Diseases ...	43·0	8·06	3·48	19·3	11·81	2·28	54·3	7·44	4·04	73·7	6·92	6·75	21·7	20·95	4·55	58·1	16·98	9·85	38·5	12·44	4·79
Phthisis Pulmonalis ...	8·9	32·00	2·83	5·4	41·12	2·23	1·3	33·33	·45	2·7	18·18	·48	2·1	57·14	1·18	2·1	40·74	·86	4·8	36·93	1·77
Dropsy ...	2·7	44·74	1·20	2·1	39·03	·82	...	...		1·5	66·67	·96	1·5	40·00	·58	·9	33·33	·31	1·8	42·06	·77
Atrophy and Anæmia ...	17·3	22·95	3·96	12·3	27·16	3·34	5·4	50·00	2·69	4·3	44·44	1·93	14·4	43·88	6·32	3·6	23·91	·86	11·0	28·74	3·17
Scurvy ...	2·0	....		1·7	9·09	·15	7·6	58·82	4·49	7·5	...		·6	...		2·0	3·85	·08	2·3	10·07	·24
Rheumatism ...	32·2	1·95	5·59	15·6	1·47	2·80	70·0	1·48	7·19	33·3	1·29	4·09	11·7	1·59	3·37	14·2	1·51	3·36	22·1	1·60	4·14
Venereal Diseases ...	20·4			15·7			29·2			23·1			16·9			12·6			17·3		
Eye Diseases ...	10·0			10·2			13·5			9·9			17·5			16·1			12·3		
Abscess and Ulcer ...	45·8			84·3			241·6			124·3			93·6			76·3			83·2		
Injuries ...	39·9			33·7			43·1			38·3			29·9			24·5			33·4		
All other Causes ...	138·6			60·8			87·6			89·4			42·5			79·1			90·7		
	1178·4	...	46·32	812·8	...	33·53	1397·4	...	37·27	955·0	...	33·73	779·9	...	56·04	1072·1	...	35·98	982·4	...	41·92

JAILS OF THE BENGAL PRESIDENCY, 1870.

IX.

TABLE showing the GENERAL STATISTICS of SICKNESS and MORTALITY in the JAILS of the BENGAL PRESIDENCY, and the AVERAGE NUMBER DAILY SICK in each Month.

STATIONS.	Average Strength for the year.	Daily Sick per 1,000 of Average Strength in each Month. Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Daily Sick per 1,000 of Average Strength for the Year.	Admitted into Hospital per 1,000 of Average Strength.	Died per 1,000 of Average Strength. A. Cholera.	B. All other Causes.	C. All Causes.
Allipore ..	2,513	48·5	45·2	43·1	42·0	47·4	46·8	56·7	65·6	66·1	61·7	70·6	56·4	54·1	1497·8	5·57	44·17	49·74
Baraset ...	306	30·1	38·3	33·1	40·0	33·8	45·7	42·5	44·7	46·4	33·0	40·6	29·1	39.2	1020·4	3·27	58·82	62·09
Jessore ...	513	35·5	34·5	31·4	45·3	34·6	30·3	34·1	43·7	42·4	45·0	40·7	51·3	40·0	1163·7	...	...	17·54
Kishnaghur .	367	20·4	27·1	31·5	34·8	42·5	38·4	29·6	43·6	50·8	40·3	35·5	23.8	35·4	784·7	...	...	24·52
Moorshedabad ...	198	59·4	30·9	31·5	29·6	27·0	27·6	40·2	60·3	75·0	25·5	76·1	45·7	45·5	1010·1	85·86	60·61	146·47
Howrah	104	21·3	10·1	29·7	31·9	41·7	45·9	42·7	46·7	53·1	47·2	38·5	28·3	38·5	913·4	...	...	48·08
Serampore ...	34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	29·41
Hooghly ...	572	47·1	46·3	48·9	51·7	52·1	53·6	55·9	57·8	44·5	52·0	41·5	41·1	48·9	1993·0	33·22	33·21	66·43
Burdwan ...	225	33·7	29·0	64·9	46·7	28·2	9·0	18·7	19·7	22·1	38·5	53·2	38·7	35·5	1293·3	...	...	57·78
Bancoorah ...	368	7·5	10·2	16·3	15·2	9·9	12·5	8·3	8·6	17·3	16·0	11·8	15·0	13·6	366·9	...	...	...
Purulea ...	148	31·4	36·6	37·3	41·2	30·5	31·0	23·6	16·9	23·6	21·6	13·3	7·1	27·0	1236·5	...	...	20·27
Raneegunge ...	21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	47·62
Sooree ...	152	41·9	40·9	33·7	28·9	32·3	37·0	83·3	56·0	45·5	53·4	35·7	42·0	46·1	1592·1	6·58	19·74	26·32
Rajmehal and Pakour	163	.	5·2	9·6	19·4	9·7	14·0	17·7	11·9	40·3	34·8	20·5	17·5	18·4	674·9	67·48	24·54	92·02
Deoghur and Sub-divns.	97	22·0	21·1	38·5	24·2	13·3	15·9	9·8	24·4	24·1	35·3	16·4	15·4	20·6	752·6	10·31	20·62	30·93
Malda ...	61	54·8	24·7	29·4	42·5	31·5	51·7	76·9	80·0	59·7	74·6	127·0	132.1	65·6	2655·8	...	...	16·39
Dinagepore ...	348	20·9	25·4	41·0	43·2	27·8	20·7	53·5	48·3	65·1	64·5	50·4	53·5	43·1	1566·0	...	...	68·96
Rajshahye ...	637	15·1	17·2	20·2	25·1	24·7	23·9	30·1	35·9	33·2	30·6	90·0	60·3	31.5	714·3	12·56	64·36	76·92
Rungpore ...	285	47·2	51·3	51·9	62·3	58·3	96·5	63·0	72·8	65·0	58·4	66·6	54·1	59·6	1332·8	...	...	122·81
Bograh ...	140	28·5	40·7	41·0	46·5	40·5	26·0	27·2	62·5	47·2	72·0	55·6	65·6	47·0	1335·6	...	...	80·54
Mymensingh ...	610	37·8	23·9	23·5	21·0	23·3	22·0	25·6	28·8	25·1	18·0	30·4	20·1	20·2	818·0	...	...	37·70
Pubna ...	187	47·2	52·0	63·2	71·0	70·1	45·0	54·5	45·2	56·8	60·0	62·5	71·4	58·8	2002·6	...	...	37·43
Furreedpore ...	315	23·3	23·8	22·1	24·5	25·5	35·7	25·6	20·5	20·7	19·8	26·7	22·4	25·4	1028·6	...	...	22·22
Backergunge .	393	45·0	40·6	33·6	37·0	48·3	26·2	29·1	30·6	30·5	19·8	23·9	37·2	33·1	1043·3	7·63	83.97	91·60
Noacolly ...	211	18·7	15·7	19·6	26·9	34·5	13·2	29·4	20·1	26·7	48·9	22·2	22·6	23·7	1170·6	...	...	18·96
Chittagong ...	225	29·7	25·0	28·9	30·6	47·2	44·8	27·5	32·0	42·6	41·5	55·8	23·6	35·6	1302·2	...	...	22·22
Tipperah .	337	12·3	9·0	8·6	17·9	16·6	5·6	8·4	11·9	12·0	15·3	13·2	18·2	11·9	546·0	...	...	23·74
Dacca ...	567	33·9	34·5	38·4	36·8	36·5	40·4	32·4	37·1	37·7	36·0	35·4	40·5	37·0	1148·1	7·06	19·40	26·46
Sylhet ...	393	22·8	16·0	27·3	38·5	33·1	43·0	64·0	41·9	27·0	31·9	37·1	10·7	33·2	1244·9	2·55	7·65	10·20
Shillong ..	50	.	...	...	...	...	...	...	...	..	...	...	...	...	..	...	...	120·00
Cachar ...	123	40·5	31·7	16·9	7·6	20·0	42·9	33·3	33·1	51·7	43·1	28·3	60·0	32·5	1252·0	...	...	16·26
Naga Hills ...	10	.	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...
Gowalpara ...	113	38·1	27·5	34·8	43·1	71·4	63·0	90·9	96·2	87·4	64·8	68·0	61·9	61·9	2300·9	8·85	35·40	44·25
Gowhatty ...	115	7·4	7·2	21·1	7·2	7·9	...	17·9	9·6	2·8	21·1	31·9	11·4	17·4	478·2	...	...	17·39
Seebsaugor ...	133	15·4	14·7	24·2	30·8	34·5	59·6	56·3	42·6	38·5	34·8	63·5	39·4	37·6	2195·5	7·52	30·08	37·60
Nowgong ...	72	15·6	15·6	37·0	35·7	66·7	78·7	34·5	38·0	54·1	51·9	56·3	54·1	41·7	1222·2	...	...	27·78
Tezpore ..	198	36·5	56·4	65·0	47·4	69·8	64·4	62·5	63·8	51·0	47·1	65·3	61·9	55·6	2596·0	...	...	30·30
Debrooghur ..	83	40·0	38·0	37·0	56·5	40·4	49·5	41·7	34·1	84·3	65·8	41·7	61·5	48·2	2891·6	...	..	...
Midnapore ...	1,038	12·8	23·1	15·4	15·0	19·0	24·5	27·8	27·3	21·3	15·9	25·9	45·6	23·1	770·4	6·75	41·42	48·17
Balasore ..	141	40·3	30·1	52·6	45·1	27·4	10·2	13·0	28·4	40·8	33·3	20·7	36·0	35·5	950·4	...	..	35·46
Cuttack ..	267	..	7·1	17·7	14·0	11·5	30·7	50·2	63·8	40·8	21·8	17·0	9·2	23·3	949·4	101·17	15·56	110·73
Pooree	106	8·7	17·9	9·2	18·0	17·7	17·1	42·7	74·1	46·0	43·0	51·0	33·3	28·3	990·5	28·30	9·44	37·74
Monghyr	323	16·6	20·6	18·4	12·4	17·0	21·1	16·3	27·6	23·6	22·4	27·0	27·4	21·7	594·4	3·10	18·57	21·67
Bhaugulpore .	404	31·1	22·1	15·6	12·3	10·0	25·9	25·2	28·0	18·9	12·0	11·3	13·5	19·8	314·6	2.48	14·85	17·33
Purneah	308	20·6	17·2	26·6	18·4	23·2	23·1	20·3	29·3	13·2	20·3	22·4	34·1	22·7	616·9	3·25	38·96	42·21
Julpigoree .	112	73·8	66·7	82·6	121·7	95·2	95·7	106·4	64·2	64·8	61·4	59·3	64·5	80·4	1375·0	...	...	80·36
Darjeeling ...	61	..	14·1	15·2	32·8	17·8	15·9	...	15·6	15·6	...	18·2	...	10·4	491·8	...	...	16·39
	14,143	32·0	31·3	32·7	33·5	34·4	35·7	30·4	43·2	41·9	39·3	46·2	40·9	37·3	1178·4	8·56	37·96	46·52
Chyebassa ...	84	63·8	52·6	83·3	74·5	56·8	51·4	83·3	77·9	65·8	56·3	42·9	41·1	59·5	2142·9	11·90	23·81	35·71
Ranchee	213	34·5	34·0	26·0	31·1	46·6	45·7	72·0	69·1	53·3	38·3	35·1	47·2	45·3	1065·9	37·04	32·96	70·00
Hazareebaugh, Central	712	18·3	19·1	21·2	22·3	20·7	19·2	28·0	26·5	10·9	47·7	46·4	30·7	26·7	1120·8	16·86	8·42	25·28
" District	286	16·1	16·2	22·2	20·3	23·9	30·1	47·5	42·1	35·6	36·7	40·7	23·4	28·0	1220·3	27·98	13·98	41·96
Gyah ...	409	42·7	31·6	28·4	36·2	30·0	29·9	27·6	37·0	26·0	33·7	30·2	31·9	31·8	1024.5	2·44	44·01	46·45
Patna ...	454	42·1	35·8	29·2	31·7	24·3	8·8	16·1	41·9	20·5	28·9	20·6	12·7	20·4	1002·2	17·62	46·26	63·88
Deegah & Dehree Ghat	543	24·2	13·2	11·9	27·9	20·3	14·9	20·3	21·2	33.3	45·7	46·5	24·8	25·8	1038·7	29·47	31·30	60·77
Arrah .	331	23·3	26·0	18·9	17·1	14·7	12·1	26·8	20·8	40·9	32·6	19·7	17·1	24·2	694·8	...	...	27·19
Chumparun ..	196	8·8	14·9	24·6	31·4	15·5	20·6	31·6	35·7	33·1	32·1	31·3	9·9	25·5	923·5	..	...	35·71
Mozufferpore	345	11·3	14·6	34·2	35·7	37·0	20·6	19·2	25·9	36·2	49·9	51·0	36·6	31·9	985·2	...	...	57·97
Chuprah ...	294	11·7	7·0	6·9	10·2	13·1	13·8	16·9	32·8	33·6	24·2	16·2	3·4	17·0	442·2	3·40	27·21	30·61
Ghazeepore .	495	3·6	4·2	12·5	6·4	4·4	4·0	3·9	7·0	5·8	10·2	10·9	12·3	8·1	149·5	...	.	30·30
Benares, Central ..	1,286	18·3	24·4	20·0	16·0	22·1	18·4	21·1	22·5	33·2	36·5	30·5	26·7	24·1	1017·1	..	...	18·66
" District ...	515	41·1	35·2	36·9	30·8	36·2	36·4	44·1	42·0	44·7	46·6	41·4	30·6	38·8	887·3	..	...	31·05
Mirzapore ..	280	27·1	28·8	43·0	27·6	27·9	26·2	35·6	32·5	33·1	39·9	35·0	52·8	35·7	892·8	..	...	57·14
Azimghur ...	303	14·7	12·1	11·2	14·5	10·6	5·2	2·6	15·1	9·6	26·8	27·5	12·2	12·7	502·3	...	.	26·40
Jounpore	332	30·7	72·6	37·0	43·2	22·6	10·8	10·8	22·1	20·5	44·0	35·2	16·5	33·1	1478·9	90·36	60·24	150·60
Goruckpore .	513	38·0	43·2	43·9	74·4	52·2	32·1	30·8	25·8	31·1	30·6	30·8	30·9	39·0	1304·1	1·95	97·46	99·42
Bustee .	163	25·2	24·1	28·2	38·5	40·4	25·3	21·5	10·5	25·1	23·3	18·4	28·2	24·5	742·3	...	...	18·40
Gondah .	463	17·2	20·1	16·3	23·0	31·0	33·5	20·7	37·6	28·0	37·6	34·7	24·1	28·1	769·9	...	..	32·40
Baraich .	358	11·6	11·8	11·1	11·0	15·6	16·6	17·3	24·0	18·6	18·3	19·3	14·7	16·8	206·2	...	..	19·55
Fyzabad ...	735	25·8	26·3	20·8	21·4	6·6	11·0	15·7	24·0	17·7	15·8	16·9	21·2	19·0	559·2	...	...	31·29
Sultanpore ..	420	9·9	11·0	12·2	17·3	17·8	10.3	12·0	14·9	11·3	15·1	15·3	11·5	14·0	345·0	...	...	26·19
Rae Bareilly ...	324	15·8	16·5	24·0	23·3	21·0	19·0	26·8	33.0	25·6	34·2	17·4	18·3	21·6	592·6	...	...	21·60
Pertabghur ...	145	19·2	25·6	9·0	35·4	14·5	11·6	27·4	30·5	17·2	22·0	37·3	19·9	20·7	1420·7	...	..	27·59
Hurdui ..	283	8·5	4·0	7·7	7·6	10·1	9·5	9·8	3·6	13·9	10·8	6·7	21·4	10·6	300·3	...	.	10·60
Khyree .	233	21·4	17·7	20·7	18·6	13·0	12·8	25·3	21·7	16·6	27·0	28·2	24·0	21·5	828·3	..	...	4·29
Lucknow, Central	1,735	24·2	22·8	16·7	17·8	15·6	15·4	19·8	23·4	20·3	27·2	36·3	43·1	23·6	302·0	...	.	29·97
" District	1,042	13·0	12·2	11·2	9·3	11·4	13·7	17·1	17·8	18·0	18·5	23·8	34·4	16·3	331·1	·96	21·1.	22·07
Seetapore .	837	6·8	11·4	10·8	10·3	9·4	11·1	11·2	11·3	19·3	26·0	16·4	11·3	13·1	587·8	...	..	8·36
Nawabgunge	135	22·9	34·8	23·8	7·9	15·6	16·1	14·3	2·8	13·2	23·1	14·2	12·4	14·8	874·1	..	..	44·44
Oonao .	188	25·8	30·2	37·7	29·9	27·9	35·1	34·9	31·4	40·8	82·8	75·9	44·0	37·2	1835·1	...	...	21·28
Humeerpore .	153	81·4	63·8	41·2	58·8	50·3	51·4	30·4	45·9	49·7	45·2	41·2	36·3	52·3	1575·1	...	..	58·82
Orai	136	30·4	37·7	51·7	33·6	24·6	15·3	47·0	53·7	62·1	65·9	87·5	67·9	51·5	1852·9	..	...	66·18

STATIONS.	Average Strength for the Year.	Daily Sick per 1,000 of Average Strength in each Month.												Daily Sick per 1,000 of Average Strength for the Year.	Admitted into Hospital per 1,000 of Average Strength	Died per 1,000 of Average Strength.		
		Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			A. Cholera.	B. All other Causes.	C. All Causes.
Futtehghur, Central ...	818	18·8	20·7	10·4	16·0	17·5	13·6	25·3	33·7	40·0	59·4	47·6	42·0	28·1	909·5	...	...	10·56
" District.	375	27·6	37·2	42·5	35·1	49·7	32·7	32·5	30·0	24·0	40·0	63·3	54·7	40·0	1173·4	...	...	8·00
Cawnpore ...	418	21·8	24·2	29·5	27·6	29·2	25·9	30·7	29·8	52·4	115·4	88·1	69·4	43·1	1220·1	...	...	38·28
Futtehpore ..	230	34·5	37·7	29·9	48·3	42·7	34·6	46·0	58·4	74·7	75·1	88·2	72·0	56·5	2482·6	...	...	78·26
Banda .	342	64·2	34·2	40·0	38·8	43·0	40·8	17·9	29·2	42·9	54·8	54·1	45·9	40·9	1412·3	2·92	78·95	81·87
Allahabad, Central ..	1,717	18·0	18·4	24·1	44·3	40·1	25·6	23·1	21·8	25·7	25·5	44·8	48·0	29·1	686·6	..	...	77·46
" District ...	687	16·5	18·1	20·2	17·3	14·0	16·4	14·1	18·1	20·8	23·4	13·9	22·6	17·5	684·7	...	...	33·48
Nagode ...	101	..	...	...	...	..	...	...	...	...	..	..	...	...	...	...	...	29·70
	10,757	22·4	22·7	22·9	26·0	23·9	20·1	23·7	26·9	28·8	35·4	34·6	31·0	26·1	812·8	4·50	35·33	39·83
Sumbulpore ...	60	57·1	73·5	75·8	67·6	60·6	72·7	78·4	74·1	63·5	122·8	129·6	116·3	83·3	3233·3	...	..	66·67
Raepore ...	379	61·2	43·9	34·7	41·6	49·4	40·1	28·1	23·1	31·3	47·8	57·1	64·1	42·2	1211·1	...	...	23·75
Belaspore ..	61	40·8	25·6	...	...	23·3	16·7	...	...	...	23·3	46·9	27·8	16·4	409·8	...	...	16·40
Mundla ...	48	...	...	...	...	..	..	...	...	..	...	...	...	...	...	...	..	...
Seonee ...	102	49·5	54·3	45·5	48·8	41·2	57·1	39·2	72·7	52·2	52·2	42·4	51·5	49·0	1754·9	..	..	29·41
Chindwarra	63	...	11·8	36·1	13·2	16·1	...	...	...	16·9	20·0	...	...	15·9	396·8	...	...	15·87
Baitool ...	64	...	..	...	...	..	..	...	...	...	...	...	...	...	.	...	...	15·62
Nursingpore ..	101	10·8	9·8	9·4	19·6	16·3	18·7	31·6	11·0	41·7	25·6	...	...	19·8	861·3	.	.	9·90
Hoshungabad ...	263	31·3	28·1	33·1	37·8	49·1	44·1	36·0	47·1	50·8	49·6	57·9	59·3	41·8	1802·2	...	..	41·82
Nimar ...	53	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.	.	37·74
Sehore .	25	...	...	...	...	..	...	...	...	...	...	...	...	...	...	.	..	120·00
Nagpore ...	781	26·9	24·9	20·7	10·0	19·0	23·3	38·7	61·7	83·5	86·5	85·5	89·4	46·1	1199·8	.	...	55·06
Bandhara ..	69	74·5	57·5	42·3	39·5	100·0	142·9	128·6	86·4	78·1	62·5	57·7	71·4	72·5	3087·0			57·97
Wurdah ...	43	..	...	...	...	...	..	...	...	...	...	...	...	...	...	.	.	...
Chanda ...	104	9·4	44·2	37·4	8·8	7·9	26·5	26·8	36·7	38·8	34·9	44·4	27·4	28·8	903·8	...	...	...
Sironcha ...	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...
	2,227	35·7	34·2	30·3	27·8	33·2	34·5	36·5	40·0	54·4	60·5	61·4	64·1	42·7	1307·4	.	37·27	37·27
Jubbulpore ...	637	79·9	74·7	73·7	67·3	63·8	63·6	67·2	68·0	85·7	98·7	109·5	115·1	78·5	1742·6	1·57	61·22	62·79
Dumoh ...	74	111·1	60·2	68·0	76·1	79·5	72·5	62·5	44·8	75·0	56·3	17·9	20·8	67·6	1797·3	...	...	27·03
Saugor ...	180	75·7	44·4	47·9	57·9	35·9	47·6	65·5	71·0	68·1	77·3	78·7	63·6	61·1	2155·6	..	...	83·33
Lullutpore ..	151	84·5	42·9	12·5	45·8	19·9	18·4	12·3	11·8	17·1	29·2	23·4	39·4	26·5	1000·0	..	.	66·23
Jhansi .	254	49·7	9·7	18·7	16·2	14·0	7·1	6·9	13·2	10·5	10·6	20·4	17·0	15·7	393·7	..	.	51·18
Ajmere ..	363	69·9	74·0	63·0	55·9	46·7	53·1	59·2	63·4	70·0	63·3	56·3	59·9	60·6	1410·8		..	33·06
Beaur .	74	111·1	99·3	65·2	54·8	65·6	80·0	58·8	56·6	67·6	65·0	111·1	25·0	81·1	2986·4	.	..	40·54
Muttra .	213	25·3	20·4	29·7	33·2	26·5	25·8	22·7	24·0	31·2	53·9	34·0	22·4	28·2	812·2	...	..	14·09
Agra, Central ..	1,685	10·9	19·0	18·8	23·4	28·0	26·6	26·1	33·7	38·2	25·4	22·6	11·9	24·3	513·4	..	..	17·80
" District ..	520	7·6	7·9	9·9	11·5	15·9	24·9	16·5	22·1	15·3	10·1	11·3	15·7	15·5	575·0	...		23·08
	4,150	43·6	37·0	34·7	38·1	34·6	35·2	34·6	38·3	43·9	41·0	39·3	34·4	37·8	955·0	·24	33·49	33·73
Etawah ...	247	9·3	9·1	9·0	8·6	12·9	7·5	10·3	11·9	27·9	59·5	15·2	11·5	16·2	1024·2		...	28·34
Mynpoorie ...	294	17·1	26·7	25·2	22·1	18·9	30·2	21·1	29·2	43·3	34·3	37·0	39·2	27·2	928·6	...	...	20·41
Etah ...	233	13·2	8·2	8·0	8·9	18·5	19·2	12·9	46·6	26·8	28·0	29·6	28·1	21·5	442·0	...	..	8·58
Allyghur ...	528	10·8	16·1	19·1	15·1	12·8	11·6	9·0	12·7	12·6	20·5	16·6	14·5	13·3	630·7	.	.	7·58
Bolundshuhur ..	157	7·5	...	7·3	...	13·2	6·1	19·9	17·5	26·9	42·7	33·5	20·4	19·1	859·9	...	..	12·74
Shahjehanpore ...	298	30·2	24·4	28·2	24·8	26·8	12·7	15·9	11·2	15·0	24·4	24·9	22·8	23·5	416·1	..		23·49
Budaon ..	302	4·9	2·7	...	6·7	6·8	3·3	6·8	6·4	7·4	18·3	19·5	11·4	6·6	231·8		..	9·93
Bareilly, Central .	1,340	17·4	21·6	28·0	20·9	27·0	24·8	20·5	20·6	24·5	27·8	25·7	25·7	23·9	814·2	..	..	57·46
" District (10 Months) ...	494	...	...	19·0	17·4	17·0	15·4	16·1	19·6	19·0	20·6	26·9	27·3	20·2	856·3	.	...	30·36
Moradabad ...	322	8·6	11·8	12·5	11·7	10·4	12·4	2·9	14·5	15·4	24·2	17·7	10·2	12·4	341·7	..	.	55·90
Almorah ...	146	35·2	28·8	43·2	34·5	47·9	53·8	49·0	40·0	39·7	51·9	37·3	44·3	41·1	1472·6	..	..	41·10
Deyrah ..	49	...	...	...	...	20·0	18·9	40·8	46·5	85·1	86·2	48·4	46·2	40·8	1408·1	.	.	20·41
Bijnore ...	221	7·6	6·8	10·3	5·1	9·6	27·3	19·0	14·0	60·3	33·9	17·4	19·1	18·1	823·5		..	4·52
Saharunpore	219	40·9	26·5	25·8	24·7	11·7	25·1	23·3	180·9	215·3	127·3	100·0	72·0	86·8	1972·6	...		141·55
Mozuffernuggur ...	112	8·8	21·7	10·3	31·1	16·7	15·6	23·4	41·7	27·0	25·9	17·1	27·0	17·9	401·0		...	80·36
Meerut, Central ...	1,330	22·2	16·2	16·8	11·2	14·8	14·5	14·7	24·6	30·9	32·1	53·2	66·3	25·6	639·9	..	..	101·50
" District	524	31·8	27·2	21·2	22·5	27·4	28·6	31·1	25·3	31·2	41·5	59·4	57·2	32·4	1137·4	.		110·69
	6,816	17·4	17·4	19·1	16·8	18·9	18·3	17·3	27·9	34·1	35·5	35·5	35·6	24·4	779·9	.	56·04	56·04
Delhi ...	306	22·5	21·9	22·0	23·6	24·0	31·6	33·2	52·6	68·4	71·2	51·6	41·3	38·3	1852·5	...	.	73·77
Rohtuck ...	209	9·6	10·4	11·0	17·1	5·8	...	4·8	34·1	34·9	64·3	28·9	16·5	19·1	1062·2		.	23·92
Hissar .	218	...	10·7	4·9	8·9	17·0	24·5	9·5	43·5	48·2	45·0	17·1	13·1	22·0	986·2	..	...	50·46
Sirsa	342	16·8	16·1	15·4	18·6	18·9	34·2	45·5	39·3	28·2	25·1	31·3	18·6	26·3	804·1	...	.	26·32
Kurnaul ...	226	11·7	10·2	9·3	9·5	8·8	8·3	4·0	38·0	18·9	17·2	17·7	14·0	13·3	893·8	..	.	22·12
Umballa ...	705	22·4	27·8	29·0	22·5	22·2	22·6	34·5	36·9	82·5	82·1	32·1	25·2	36·0	1275·2		.	24·11
" Gang at Roopar	387	3·5	6·9	6·6	7·5	6·0	10·0	7·1	9·2	11·5	9·8	12·6	12·0	10·3	899·2		.	31·01
Loodianah ..	270	21·7	28·6	24·3	20·4	24·2	27·8	28·1	37·3	59·4	65·7	44·5	32·1	33·3	1800·0	..	.	48·15
Jullundur .	372	17·9	26·9	30·0	24·6	23·3	29·2	23·6	24·4	22·2	32·8	15·3	9·8	24·2	352·2	..	.	21·51
Ferozepore	390	7·6	2·5	7·5	15·4	15·0	17·5	25·7	16·4	17·1	34·3	11·1	8·8	15·4	387·2	..	.	2·56
Umritsur .	537	6·3	5·7	5·9	9·9	14·5	10·8	10·8	14·9	15·0	17·6	7·2	5·2	11·2	504·7	.	.	24·21
Lahore, Central .	2,190	62·1	65·9	22·4	27·7	21·7	11·2	6·6	8·8	19·8	23·1	21·2	13·6	25·1	516·9		.	42·01
" Female Jail ..	186	52·6	33·1	39·0	37·5	48·6	65·7	76·9	107·3	152·0	101·9	65·7	51·0	69·0	2935·5		.	112·90
Sealkote	369	20·1	11·7	18·6	24·2	28·7	16·5	28·6	30·2	41·8	33·0	25·1	20·3	24·4	1268·3			10·84
Dhurmsalla	146	7·6	...	7·2	...	7·0	7·0	20·5	33·8	44·9	43·8	31·4	26·3	20·5	911·0			20·55
Goordaspore	295	17·2	28·3	30·2	15·3	21·7	14·3	19·6	21·9	31·8	36·5	18·5	16·2	23·7	1142·4			23·73
Goojranwalla	445	11·7	4·7	4·6	2·2	6·9	11·4	8·6	8·2	10·7	8·9	9·3	9·6	9·0	366·3			11·24
Goojrat .	327	9·7	6·2	14·9	9·4	3·8	10·5	8·9	6·0	2·7	11·1	5·5	3·0	9·2	308·9			12·23
Shahpore .	315	14·1	14·1	14·0	8·5	6·9	13·3	16·9	22·2	25·7	21·0	5·2	5·6	12·7	390·5			15·87
Jhelum ..	244	18·5	8·1	...	9·9	4·9	4·8	14·0	17·4	30·4	13·1	29·0	30·4	16·4	880·4			28·69
Montgomery .	627	17·5	23·8	17·1	21·8	20·4	11·6	13·1	12·4	14·7	21·2	23·2	23·7	17·5	531·1			31·90
Mooltan ..	720	25·1	49·0	48·0	33·4	35·6	19·2	18·8	15·5	17·8	14·6	17·0	14·5	26·1	880·6			65·84
Jhung .	361	17·6	20·3	16·8	17·4	13·7	17·3	11·0	7·0	13·9	12·0	10·9	11·7	13·8	437·7			5·54
Dera Ghazee Khan ...	407	30·7	38·1	41·2	39·4	41·8	36·8	37·3	42·6	54·4	80·7	77·3	51·2	47·1	2447·5			14·00
Dera Ismael Khan ..	363	29·4	30·0	20·5	27·6	38·2	34·9	29·0	43·9	37·8	39·4	37·3	47·0	35·8	1400·4			38·57
Kohat ...	155	6·3	11·7	25·2	20·7	34·2	44·0	45·2	48·3	61·1	69·9	69·2	32·6	38·7	1858·7			12·90
Bunnoo ...	106	21·1	27·3	38·1	46·7	50·0	35·3	50·0	48·1	45·9	41·0	37·0	47·6	37·7	1962·3			47·17
Rawulpindee ..	942	45·1	59·5	41·1	59·2	54·4	38·8	29·6	45·3	87·6	117·6	81·5	40·6	58·4	1990·5	...	.	71·13
Peshawur ..	406	47·4	38·3	29·0	36·3	37·3	26·4	24·9	28·5	51·7	35·1	43·2	32·7	36·3	1546·1	...	.	52·42
	12,785	28·5	32·2	23·0	21·5	24·4	21·0	20·5	25·6	36·5	39·2	29·2	21·6	27·3	1072·1	...	35·98	35·98
BENGAL PRESIDENCY...	59,878	27·2	27·5	26·0	27·2	27·1	25·4	27·3	32·1	36·2	38·5	37·2	33·1	30·3	982·1	3·52	38·40	41·92

JAILS OF THE BENGAL PRESIDENCY, 1870.

X.

TABLE showing the RATIO in which the PRINCIPAL DISEASES have contributed to make up the ADMISSION-RATE of the Year in the JAIL HOSPITALS of the BENGAL PRESIDENCY.

STATIONS.	Average Strength for the Year.	ADMITTED INTO HOSPITAL PER 1,000 OF AVERAGE STRENGTH.												Admitted per 1,000 of the Average Strength from all Causes.
		Cholera.	Fever, Intermittent.	Fever, Remittent and Continued.	Dysentery & Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Phthisis Pulmonalis.	Dropsy.	Atrophy and Anæmia.	Scurvy.	All other Causes.	
Allipore	2,513	24·3	678·1	1·2	389·2	2·0	15·1	20·6	5·5	·4	21·9	2·4	331·1	1497·8
Baraset	306	3·3	323·5	39·2	356·2	...	35·9	68·6	9·8	...	13·1	3·3	176·5	1029·4
Jessore	513	...	733·0	31·2	107·2	2·0	29·2	52·6	17·5	...	2·0	...	189·1	1163·7
Kishnaghur	367	...	335·1	...	188·0	...	27·2	51·8	5·5	...	...	...	177·1	784·7
Moorshedabad	198	151·5	500·0	...	212·1	...	5·1	...	5·1	...	10·1	...	136·2	1010·1
Howrah	104	...	384·6	...	192·3	...	38·5	28·8	...	...	9·6	...	259·6	913·4
Serampore	84	...	...	...	...	...	...	...	...	...	...	...	...	...
Hooghly	572	66·4	736·0	1·8	491·3	...	36·7	22·7	35·0	7·0	19·2	...	576·9	1993·0
Burdwan	225	...	977·8	13·3	120·0	...	26·7	8·9	4·4	...	...	...	142·2	1293·3
Bancoorah	368	2·7	214·7	...	21·5	...	2·7	29·9	2·7	...	...	...	89·7	366·0
Purulea	148	6·8	662·1	...	189·2	6·8	6·8	54·0	...	...	20·3	...	290·5	1236·5
Raneegunge	21	...	...	...	...	...	...	...	...	...	...	...	...	...
Sooree	152	39·5	375·0	59·2	381·6	...	39·5	144·7	...	...	59·2	13·1	480·3	1592·1
Rajmehal and Pakour	163	135·0	306·7	49·1	153·4	...	...	...	...	...	...	...	30·7	674·9
Deoghur and Sub-divisions	97	10·3	206·2	30·9	206·2	...	10·3	10·3	...	...	...	...	278·4	752·6
Malda	61	49·2	1295·0	49·2	786·9	...	65·6	65·6	...	49·2	16·4	...	278·7	2655·8
Dinagepore	348	5·7	821·8	...	201·5	8·6	23·0	94·8	...	28·8	8·6	...	313·2	1506·0
Rajshahye	637	15·7	240·2	...	321·8	...	39·2	15·7	3·1	4·7	20·5	1·6	51·8	714·3
Rungpore	285	...	849·1	...	249·1	...	...	49·1	14·1	10·5	35·1	...	115·8	1322·8
Bograh	149	6·7	557·1	40·3	322·2	...	20·1	40·3	20·1	...	60·5	6·7	241·6	1335·6
Mymensingh	610	3·3	273·8	...	188·5	...	4·9	45·9	14·8	1·6	6·6	1·6	277·0	818·0
Pubna	187	5·3	1074·9	42·8	411·8	...	117·6	107·0	10·7	...	...	5·3	1187·2	2962·6
Furreedpore	315	...	609·5	12·7	130·2	...	19·0	22·2	15·9	...	3·2	...	215·9	1028·6
Backergunge	393	12·7	335·9	2·5	483·5	...	5·1	10·2	...	...	...	...	193·4	1043·3
Noacolly	211	14·2	677·7	4·7	208·5	...	19·0	28·5	4·7	...	...	...	213·3	1170·6
Chittagong	225	13·3	448·9	4·5	302·2	...	...	213·3	4·5	4·5	22·2	...	288·8	1302·2
Tipperah	337	...	290·8	...	56·4	...	14·8	8·9	14·8	...	5·9	3·0	151·4	546·0
Dacca	567	10·6	440·9	3·5	199·3	7·1	15·9	75·8	12·3	...	19·4	1·8	361·5	1148·1
Sylhet	392	2·6	803·6	...	188·8	...	...	7·6	5·1	...	...	30·6	206·6	1244·9
Shillong	50	...	...	...	...	...	...	...	...	...	...	...	...	...
Cachar	123	...	447·2	...	195·1	...	...	89·4	...	8·1	16·3	...	495·9	1252·0
Naga Hills	10	...	...	...	...	...	...	...	...	...	...	...	...	...
Gowalpara	113	8·8	938·1	...	513·3	17·7	26·6	106·2	17·7	8·8	53·1	...	610·6	2300·9
Gowhatty	115	...	121·7	...	104·3	...	8·7	69·6	8·7	8·7	26·1	...	130·4	478·2
Seebsaugor	133	7·5	977·4	112·8	624·1	...	15·0	60·2	...	7·5	22·6	...	308·4	2195·5
Nowgong	72	...	652·8	...	388·9	...	41·6	13·9	...	...	...	...	125·0	1222·2
Tezpore	198	5·1	843·4	5·1	454·5	...	25·3	95·0	...	...	5·1	...	1161·6	2596·0
Debrooghur	83	...	988·0	12·0	518·1	...	12·0	84·4	...	12·0	...	...	1265·1	2891·6
Midnapore	1,038	24·1	223·5	19·3	125·2	9·6	6·7	70·3	20·2	3·9	54·0	...	222·6	779·4
Balasore	141	...	375·9	...	255·3	7·1	7·1	35·5	...	...	...	...	269·5	950·4
Cuttack	257	167·3	354·1	...	179·0	...	...	23·3	3·9	...	15·6	...	206·2	949·4
Pooree	106	84·9	226·4	...	198·1	...	...	28·3	9·4	...	...	...	443·4	990·5
Monghyr	323	6·2	201·2	3·1	170·3	...	9·3	31·0	6·2	...	...	...	167·1	594·4
Bhaugulpore	404	2·5	49·5	5·0	27·2	2·5	2·5	5·0	...	...	12·3	...	235·1	341·6
Purneah	308	3·2	194·8	45·5	172·1	13·0	19.5	22·7	9·8	3·2	16·2	...	116·9	616·9
Julpigoree	112	...	276·8	...	875·0	...	8·9	53·6	...	...	...	8·9	151·8	1375·0
Darjeeling	61	...	196·7	16·4	82·0	...	...	16·4	16·4	...	...	...	163·9	491·8
	14,143	20·0	500·8	9·8	266·0	2·2	17·3	43·0	8·8	2·7	17·3	2·0	288·5	1178·4
Chyebassa	84	23·8	1178·6	131·0	857·1	...	23·8	...	...	...	...	...	428·6	2142·9
Ranchee	243	41·2	325·1	...	374·5	...	...	8·2	...	24·7	4·1	...	288·1	1065·9
Hazareebaugh, Central	712	44·9	744·4	...	52·0	...	4·2	19·7	...	2·8	9·8	...	243·0	1120·8
" District	286	136·4	636·4	3·5	157·3	...	10·5	14·0	...	...	21·0	...	241·2	1220·3
Gyah	409	4·9	393·6	...	291·0	...	...	14·7	12·2	2·4	14·7	4·9	286·1	1024·5
Patna	454	41·9	319·4	...	337·0	...	2·2	22·0	8·8	2·2	19·8	...	248·9	1002·2
Deegah and Dehree Ghat*	543	86·6	596·7	...	151·0	...	...	44·2	7·4	1·8	16·6	3·7	130·7	1038·7
Arrah	331	3·0	196·4	18·1	317·2	3·0	...	21·1	3·0	9·1	6·1	...	117·8	694·8
Chumparun	196	5·1	331·6	5·1	352·1	...	...	15·3	...	5·1	30·6	5·1	173·5	923·5
Mozufferpore	345	...	269·6	8·7	333·3	...	2·9	31·9	...	...	14·5	11·6	292·7	965·2
Chuprah	294	3·4	112·3	...	268·7	...	6·8	...	...	...	...	...	51·0	442·2
Ghazeepore	495	...	32·3	18·2	46·5	...	...	8·1	...	...	...	...	44·4	149·5
Benares, Central	1,286	...	532·7	...	213·1	...	...	7·7	·8	...	·8	...	262·0	1017·1
" District	515	...	322·3	...	219·4	3·9	17·5	5·8	1·9	...	1·9	...	314·6	887·3
Mirzapore	280	...	385·7	7·1	160·7	...	14·3	7·1	...	10·7	...	...	307·2	892·9
Azimghur	393	...	185·8	86·5	114·5	...	...	5·1	...	5·1	17·8	2·5	145·0	562·3
Jounpore	332	301·2	412·7	3·0	409·6	...	3·0	21·1	...	3·0	18·1	...	307·2	1478·9
Goruckpore	513	5·8	341·1	83·8	436·7	...	7·8	31·2	2·0	5·8	48·8	...	341·1	1304·1
Bustee	163	...	269·9	...	159·5	...	...	36·8	...	...	...	...	276·1	742·3
Gondah	463	...	244·1	66·9	159·8	...	2·2	25·9	2·2	2·2	6·5	34·5	224·6	768·9
Baraich	358	...	69·8	11·2	39·1	...	2·8	30·7	...	...	19·6	...	95·0	268·2
Fyzabad	735	4·1	200·0	6·8	210·9	...	2·7	12·3	5·4	2·7	...	...	114·3	559·2
Sultanpore	429	...	139·9	...	114·2	...	...	9·3	...	...	4·7	...	76·9	345·0
Rae Bareilly	324	...	317·9	12·3	98·8	...	...	3·1	...	3·1	...	3·1	154·3	592·6
Pertabghur	145	...	682·8	...	124·1	...	...	27·6	...	...	...	...	586·2	1420·7
Hurdui	283	...	141·3	...	14·1	...	3·5	7·1	...	...	7·1	...	127·2	300·3
Kheree	233	...	343·3	4·3	120·2	...	...	38·6	...	...	...	...	321·9	828·3
Lucknow, Central	1,735	...	62·2	31·7	69·2	1·2	2·3	24·2	28·8	1·7	30·0	2·3	48·4	302·0
" District	1,042	1·0	111·3	1·9	97·9	...	3·8	14·4	23·0	1·0	21·1	...	55·7	331·1
Seetapore	837	...	285·5	2·4	87·2	...	1·2	7·2	2·4	...	1·2	...	200·7	587·8
Nawabgunge	135	...	370·4	...	214·8	...	...	7·4	...	...	7·4	...	274·1	874·1
Oonao	188	...	1053·2	...	234·0	...	26·6	31·9	...	...	5·3	...	484·1	1835·1
Humeerpore	153	...	627·5	19·6	228·8	...	98·0	98·0	...	...	26·1	...	477·1	1575·1
Oraie	136	...	1088·2	...	375·0	...	7·4	14·7	...	22·0	7·4	...	338·2	1852·9

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* The prisoners were transferred from Deegah to Dehree Ghat in March.

STATIONS.		Average Strength for the Year.	Admitted into Hospital per 1,000 of Average Strength.												Admitted per 1,000 of the Average Strength from all Causes.
			Cholera.	Fever, Intermittent.	Fever, Remittent and Continued.	Dysentery & Diarrhœa.	Hepatitis.	Spleen Diseases.	Respiratory Diseases.	Phthisis Pulmonalis.	Dropsy.	Atrophy and Anæmia.	Scurvy.	All other Causes.	
Futtehghur, Central	...	818	...	275·1	17·1	183·4	1·2	6·1	22·0	...	3·7	13·4	...	387·5	909·5
„ District	...	375	...	482·7	40·0	160·0	...	...	13·3	2·7	...	2·7	...	472·0	1173·4
Cawnpore	...	418	...	645·9	2·4	217·7	...	14·4	4·8	4·8	..	16·7	...	313·4	1220·1
Futtehpore	...	230	..	1221·7	...	733·1	...	4·4	47·8	...	..	4·4	..	465·2	2482·6
Banda	...	342	2·9	628·7	...	260·2	...	55·6	76·0	...	8·8	..	2·9	377·2	1412·3
Allahabad, Central	...	1,717	...	195·1	3·5	277·8	·6	4·7	22·1	2·3	..	15·7	.	164·8	686·0
„ District	...	687	...	235·8	7·3	186·3	...	...	4·4	2·9	..	13·1	...	184·9	634·7
Nagode	...	101	...	940·6	89·1	237·6	...	...	79·2	...	...	...	9·9	653·5	2009·9
		19,757	13·3	332·3	13·6	193·7	·3	5·3	19·3	5·4	2·1	12·3	1·7	213·5	812·8
Sumbulpore	...	60	...	983·3	33·3	966·7	...	...	183·3		...	...	...	1066·7	3233·3
Raepore	...	370	...	567·3	36·9	108·2	...	...	39·6	7·9		10·6	...	440·6	1211·1
Belaspore	...	61	...	16·4	...	180·3	...	16·4	...	...	...	.	..	196·7	409·8
Mundla	...	48	...	...	...	...	...	...	...	...			..	...	...
Seonee	...	102	...	647·1	9·8	245·1	.	19·6	58·8	...	.	...	..	774·5	1754·9
Chindwarra	..	63	...	63·5	15·9	31·7	..	..	15·9	..	.	31·7		238·1	396·8
Baitool	...	64	...	15·6	...	62·5	..	...	...	.	..	...		78·1	156·2
Nursingpore	...	101	..	237·6	69·3	158·4	...	...	69·3	.	..	9·9	.	316·8	881·3
Hoshungabad	...	263	...	1003·8	26·6	235·7	...	3·8	41·8		...	11·4	...	470·1	1,802·2
Nimar	...	53	...	1320·8	...	264·1	...	...	132·1	...	..		...	735·8	2,452·8
Sehore	...	25	..	...	...	...	...	...	...	..	.	.	...	...	...
Nagpore	...	781	...	571·1	2·6	115·2	1·3	6·4	69·1	..	.	2·6	10·2	412·3	1199·8
Bandhara	...	69	...	1246·4	...	246·4	...	43·5	43·5	...	..		29·0	1478·2	3087·0
Wurdah	..	43	...	...	...	...	...	...	...	...	..		...	...	...
Chanda	...	104	...	423·1	...	38·4	...	...	...	.	...	...	...	442·3	903·8
Sironcha	.	10	...	...	...	...	...	..	...	...		.	..	.	...
		2,227	...	651·1	16·2	160·7	·5	6·3	54·3	1·3	...	5·4	7·6	485·0	1397·4
Jubbulpore	...	637	1·6	511·8	20·4	434·8	...	6·3	169·5	...	1·6	1·6	1·6	593·4	1742·6
Dumoh	..	74	...	567·6	27·0	229·7	...	13·5	94·6	...	..	...	...	864·9	1707·3
Saugor	...	180	...	694·4	33·3	355·6	...	22·2	27·8	...	5·6	16·7	..	1000·0	2155·6
Lullutpore	..	151	...	324·5	6·6	132·5	...	6·6	86·1	...	...	19·9	6·6	417·2	1000·0
Jhansi	..	254	...	166·3	35·4	47·2	...	7·9	27·6	..	...	3·9	...	165·4	303·7
Ajmere	..	363	...	581·3	168·0	231·4	.	5·5	90·2	...	2·8	5·5	...	347·1	1440·8
Beaur		74	...	810·8	27·0	418·0	...	13·5	81·1	27·0	27·0	108·1	...	1473·0	2986·4
Muttra	.	213	...	333·3	131·5	79·8	...	...	14·1	..	...	...	..	253·5	812·2
Agra, Central	.	1,085	...	185·2	·6	98·5	7·7	8·9	58·8	3·6	·6	...	17·2	132·3	513·4
„ District	.	520	...	221·2	...	119·2	...	7·7	42·3	5·8	...	...	..	178·8	575·0
		4,150	·2	322·4	29·6	180·8	3·1	8·2	73·7	2·7	1·5	4·3	7·5	321·0	955·0
Etawah	...	247	...	761·1	...	121·5	..	4·0	32·4	8·1	...	4·0	...	93·1	1024·2
Mynpoorie	...	294	...	432·0	3·4	81·6	..	...	13·6	...	3·4	10·2	...	384·4	928·6
Etah	...	233	...	150·2	34·3	42·9	...	...	17·2	...	...	4·3	..	193·1	442·0
Allyghur	..	528	.	303·0	13·3	94·7	...	...	9·5	...	...	...	...	210·2	630·7
Bolundshuhur	...	157	...	426·8	6·4	140·1	..	...	6·4	.	12·7	..	...	207·5	859·9
Shahjehanpore	...	298	...	127·5	43·6	63·8	...	...	13·4	...	10·1	3·4	...	154·3	416·1
Budaon	...	302	...	102·7	3·3	43·1	...	..	6·6	.	3·3	6·6	...	66·2	231·8
Bareilly, Central	..	1,340	...	311·9	122·4	138·8	..	1·5	9·0	·7	...	9·0	..	220·9	814·2
„ District (10 months)	...	494	...	277·3	121·5	76·9	...	..	14·2	2·0	...	4·1	..	360·3	856·3
Moradabad	...	322	...	118·0	6·2	80·7	...	...	18·6	3·1	...	21·9	..	93·2	344·7
Almorah	...	146	...	452·1	...	246·6	27·4	47·9	116·4		...	...	6·8	575·4	1472·6
Deyrah	..	49	...	816·3	...	102·0	...	...	40·8	.		61·2	.	387·8	1408·1
Bijnore	...	221	..	420·8	...	54·3	...	..	72·4	..	..	9·0	...	267·0	823·5
Saharunpore	.	210	..	1146·1	59·4	374·4	...	11·1	27·4	4·6	..	13·7		305·9	1972·6
Mozuffernuggur	...	112	..	196·4	8·9	89·3	...	...	...	8·9	8·9	.	..	178·6	491·0
Meerut, Central	.	1,330	.	245·1	1·5	180·2	..	.	33·1	1·5	·8	30·8	·8	124·1	639·9
„ District		524	..	522·9	26·7	205·8		...	19·1	1·9	1·9	13·4	3·8	251·9	1137·4
		6,816	..	339·1	42·1	142·4	·6	2·8	21·7	2·1	1·5	11·4	·6	212·6	779·9
Delhi	..	366	...	1450·8	5·5	270·5	...	5·5	38·2	.	.	...		82·0	1852·5
Rohtuck		209	...	789·5	..	167·9	9·6	4·8	19·1					81·3	1062·2
Hissar	..	218	...	816·5	...	41·3	...		32·1	27·5	4·6			64·2	986·2
Sirsa	..	342	...	404·0	...	43·9	2·9		55·6	...	2·9			233·9	804·1
Kurnaul	...	226	...	561·9	8·9	48·7	..	17·7	39·8	.	...	22·1	4·4	190·3	893·8
Umballa	.	705	...	817·0	...	231·2	...	4·3	29·8	1·4	1·4	7·1		183·0	1275·2
„ Gang at Roopar	.	387	...	568·5	..	175·7		2·6	25·8		2·6	.		124·0	899·2
Loodianah	.	270	...	996·3	122·2	203·7	3·7	7·4	40·8	.	..	...		425·9	1800·0
Jullundur	...	372	..	83·3	10·8	43·0	.		18·8	...	..	5·4		199·9	362·2
Ferozepore	..	390	..	133·3	...	30·8		...	28·2	..	...	2·6	.	192·3	387·2
Umritsur	..	537	..	355·7	3·7	54·0	1·9	...	20·5	3·7	1·9	1·9	.	61·4	504·7
Lahore, Central	...	2,190	.	541·6	5·0	78·5	..	6·8	[illegible]	4·1	.	..	·5	128·8	816·0
„ Female Jail	.	186	..	1908·6	80·6	236·6	...	43·0	16·1	5·4	...	32·3	10·8	602·1	2935·5
Sealkote	...	369	..	598·9	...	54·2	...	...	13·6	...	.	...	2·7	509·9	1268·3
Dhurmsalla		146	..	643·8	...	137·0	..	...	...	.	6·9	.	..	123·3	911·0
Goordaspore		295	..	762·7	3·4	91·5	..	17·0	23·7	...	...	10·2		233·9	1142·4
Goojranwalla	...	445	.	74·2	18·0	148·3	...	...	51·7	..	.	...	2·2	71·9	366·3
Goojrat	...	327	...	204·9	...	42·8	.	...	27·5	...	..	..		33·7	308·9
Shahpore	.	315	...	130·2	...	63·5	...	3·2	12·7	...	...	6·3	.	174·6	390·5
Jhelum	.	244	...	598·4	16·4	77·9	..	12·3	24·6		..	...	.	159·8	889·4
Montgomery	.	627	...	344·5	23·9	27·1	...	3·2	57·4	1·6	...	...	..	73·4	531·1
Mooltan	...	729	...	336·1	17·8	193·4	...	...	216·9	5·5	..	4·1	...	76·8	880·6
Jhung	.	361	...	332·4	...	41·5		2·8	2·8	2·8	..	.	...	55·4	437·7
Dera Ghazee Khan	.	467	...	1141·3	34·3	139·2	...	10·7	94·2	...	12·8	21·4	15·0	976·6	2447·5
Dera Ismael Khan	.	363	...	727·3	5·5	137·7	2·8	16·6	66·1	...	...	...	.	534·4	1490·4
Kohat	..	155	...	974·2	6·4	122·6	...	12·9	51·6	...	...	.		671·0	1838·7
Bunnoo	...	106	...	1075·5	37·7	245·3	..	...	37·7	...	...	18·9	28·3	518·9	1962·3
Rawulpindi		942	...	1413·0	4·2	172·0	1·1	6·4	107·2	2·1	...	6·4	4·2	273·9	1990·5
Peshawur	...	496	...	794·4	135·1	133·1	...	16·1	102·8	...	...	...	12·1	352·8	1546·4
		12,785	...	644·1	16·0	115·2	·6	5·9	58·1	2·1	·9	3·0	2·0	223·0	1073·1
	...	59,878	9·1	450·0	17·7	186·4	1·1	8·2	38·5	4·8	1·8	11·0	2·3	250·9	982·4

JAILS OF THE BENGAL PRESIDENCY, 1870.

XI.

TABLE showing the PREVALENCE of CHOLERA in each MONTH, and the DISTRIBUTION of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the Year.	Number of Admissions into Hospital in each Month.												Total Admissions of the Year.	Admitted per 1,000 of Average Strength.	Total Deaths of the Year.	Died per 1,000 of Average Strength.
		Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.				
Alipore	2,513	5	6	17	9	10	3	2	4	4	...	...	1	61	...	14	...
Baraset	306	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1	...
Jessore	513	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kishnaghur	367	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Moorshedabad	198	...	...	3	...	...	...	27	...	...	...	...	...	30	...	17	...
Howrah	104	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hooghly	572	...	...	...	...	...	...	...	...	38	...	...	...	38	...	19	...
Serampore	34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Burdwan	225	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bancoorah	368	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...
Purulea	148	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...
Raneegunge	21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sooree	152	...	...	...	...	...	...	...	2	1	3	...	...	6	...	1	...
Rajmehal and Pakour	163	...	...	6	14	...	...	...	...	2	...	...	...	22	...	11	...
Deoghur and Sub-Divisions	97	...	...	1	...	...	...	...	...	...	...	...	...	1	...	1	...
Malda	61	...	...	...	...	2	1	...	...	...	...	...	...	3	...	1	...
Dinagepore	348	...	...	1	...	...	1	...	...	...	...	...	...	2	...	...	...
Rajshahye	637	...	...	1	...	...	...	...	...	...	2	7	...	10	...	8	...
Rungpore	285	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bogra	149	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...
Mymensingh	610	...	...	...	...	...	1	...	1	...	...	...	...	2	...	...	...
Pubna	187	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...
Furreedpore	315	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Backergunge	393	...	1	3	...	1	...	...	...	...	...	...	...	5	...	3	...
Noacolly	211	...	...	...	2	1	...	...	...	...	...	...	...	3	...	...	...
Chittagong	225	...	...	...	3	...	...	...	...	...	...	...	...	3	...	...	...
Tipperah	337	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dacca	567	...	...	3	...	1	1	...	1	...	...	...	...	6	...	4	...
Sylhet	302	...	...	...	...	1	...	...	...	...	...	...	...	1	...	1	...
Shillong	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cachar	123	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Naga Hills	10	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...
Gowalparah	113	...	...	...	...	1	...	...	...	...	...	...	...	1	...	1	...
Gowhatty	115	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Seebsaugor	133	...	...	...	...	...	1	...	...	...	...	...	...	1	...	1	...
Nowgong	72	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tezpore	198	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...
Debrooghur	83	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Midnapore	1,038	4	6	1	2	...	8	3	1	...	...	...	...	25	...	7	...
Balasore	141	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cuttack	257	...	...	...	...	...	...	40	3	...	...	...	...	43	...	26	...
Pooree	106	...	1	...	...	...	1	6	1	...	...	...	...	9	...	3	...
Monghyr	323	...	...	...	1	1	...	...	...	...	...	...	...	2	...	1	...
Bhaugulpore	404	...	...	1	...	...	...	...	...	...	...	...	...	1	...	1	...
Purneah	308	...	...	1	...	...	...	...	...	...	...	...	...	1	...	1	...
Julpigoree	112	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Darjeeling	61	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	14,143	9	14	40	32	18	18	78	14	46	5	7	2	283	20·0	121	8·56
Chyebassa	84	...	...	...	1	1	...	...	...	...	...	...	...	2	...	1	...
Ranchee	243	...	...	...	...	...	...	7	3	...	...	...	...	10	...	9	...
Hazareebaugh, Central	712	...	...	...	...	...	3	14	15	...	...	...	...	32	...	12	...
„ District	288	...	...	...	...	...	...	36	3	...	...	...	...	39	...	8	...
Gyah	409	...	1	...	...	...	...	...	1	...	...	...	...	2	...	1	...
Patna	454	1	1	1	2	...	...	2	12	...	...	...	...	19	...	8	...
Dehree Ghat	543	...	...	...	...	...	...	47	...	...	...	...	...	47	...	16	...
Arrah	331	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...
Chumparun	198	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...
Mozufferpore	345	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chuprah	294	...	...	...	...	...	...	...	1	...	...	...	...	1	...	1	...
Ghazeepore	495	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Benares, Central	1,286	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ District	515	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mirzapore	280	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Azimghur	393	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jounpore	332	...	91	8	1	...	...	...	...	...	...	...	...	100	...	30	...
Goruckpore	513	...	...	3	...	...	...	...	...	...	...	...	...	3	...	1	...
Bustee	163		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gonda	463	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Baraich	358	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fyzabad	735	...	1	...	2	...	...	...	...	...	...	...	...		...	...	...
Sultanpore	429	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rae Bareilly	324	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Pertabghur	145	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hurdui	283	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kheree	233	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lucknow, Central	1,735	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ District	1,042	...	...	...	...	1	...	...	...	...	...	...	...	1	...	1	...
Seetapore	837	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nawabgunge	135	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Oonao	188	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Humeerpore	153	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Oraie	136	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Futtehghur, Central	818	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ District	375	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cawnpore	418	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Futtehpore	230	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Banda	342	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...
Allahabad, Central	1,717	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ District	687	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nagode	101	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	19,757	1	94	12	8	2	3	106	36	...	...	...	...	262	13·3	89	4·50

STATIONS.	Average Strength for the Year.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions of the Year.	Admitted per 1,000 of Average Strength.	Total Deaths of the Year.	Died per 1,000 of Average Strength.
		Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Sumbulpore ...	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Raepore ...	370	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Belaspore ...	61	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mundla ...	48	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Seonee ...	102	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chindwarra ...	63	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Baitool ...	64	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nursingpore ...	101	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hoshungabad ...	263	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nimar ...	53	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sehore ...	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nagpore ...	781	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bandhara ...	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Wurdah ...	43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chanda ...	104	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sironcha ...	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	2,227	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jubbulpore ...	637	...	...	...	...	1	...	...	...	...	...	...	...	1	...	1	...
Dumoh ...	74	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Saugor ...	180	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lullutpore ...	151	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jhansi ...	254	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ajmere	363	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Beaur ...	74	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Muttra ...	213	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Agra, Central	1,085	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
" District	520	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	4,150	...	...	...	...	1	...	...	...	...	...	...	...	1	·2	1	·24
Etawah	247	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mynpoorie	294	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Etah	233	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Allyghur	528	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bolundshuhur	157	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Shahjehanpore	298	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Budaon	302	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bareilly, Central	1,340	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
" District (10 months)...	194	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Moradabad ...	322	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Almorah ...	146	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Deyrah	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bijnore	221	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Saharunpore	219	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mozuffernuggur ...	112	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Meerut, Central ...	1,330	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
" District	524	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	6,816	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Delhie	368	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rhotuck	209	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hissar ...	218	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sirsa	342	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kurnaul ...	226	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Umballa	705	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
" Roopar ...	387	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Loodianah ...	270	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jullundur	372	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ferozepore	390	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Umritsur	537	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lahore, Central	2,190	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
" Female Jail	186	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sealkote	309	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dhurmsalla	146	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Goordaspore	295	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Goojranwalla	445	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Goojrat	327	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Shahpore	315	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jhelum	741	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Montgomery	627	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mooltan	729	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jhung ...	361	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dera Ghazee Khan ...	467	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dera Ismael Khan ...	363	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kohat ...	165	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bunnoo ...	106	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rawulpindee	942	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Peshawur	496	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	12,785	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
BENGAL PRESIDENCY ...	59,878	10	108	52	40	21	21	184	50	46	5	7	2	546	9·1	211	3·53

JAILS OF THE BENGAL PRESIDENCY, 1870.

XII.

TABLE showing the MORTALITY in each JAIL, the CAUSES of DEATHS, and the RATIO of DEATHS to STRENGTH.

STATIONS.	Average Strength for the Year.	Causes of Deaths.															Number of Deaths.	Died per 1,000 of th Average Strength.		
		Cholera.	Smallpox.	Fevers.	Apoplexy.	Dysentery and Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.		A. Cholera.	B. All other Causes.	C. All Causes.
Allipore ...	2,513	14	...	3	...	31	1	...	18	2	8	...	...	13	2	33	125	5·57	44·17	49·71
Baraset ...	306	1	...	7	...	5	...	...	...	...	4	...	...	2	...	...	19*	3·27	58·82	62·0
Jessore ...	513	...	...	4	...	1	...	...	1	...	...	1	...	...	1	1	9	...	...	17·51
Kishnaghur ...	367	...	...	...	...	2	...	2	3	1	...	...	...	...	...	1	9	...	...	21·52
Moorshedabad ...	198	17	...	2	...	7	...	...	...	...	...	...	...	2	...	1	29	85·86	60·61	140·47
Howrah ...	104	...	...	...	...	3	...	1	...	...	1	...	...	...	...	...	5	...	...	48·0
Serampore ...	34	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	29·41
Hooghly ...	572	19	...	1	...	11	...	1	...	...	4	1	...	...	...	1	38	33·22	33·21	66·4
Burdwan ...	225	...	...	3	1	4	...	2	...	...	1	1	...	...	...	1	13	...	...	57·7
Bancoorah ...	368	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	None	...	...	...
Purulea ...	148	...	...	...	...	1	...	...	...	...	...	...	...	2	...	...	3	...	...	20·27
Raneegunge ...	21	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	47·6
Sooree ...	152	1	...	...	...	...	...	...	...	...	...	...	...	...	...	3	4	6·58	19·74	26·32
Rajmehal and Pakour	163	11	...	...	...	4	...	...	...	...	...	...	...	...	...	...	15	67·48	24·54	92·0
Deoghur and Sub-Divisions	97	1	...	...	...	2	...	...	...	...	...	...	...	...	...	...	3	10·31	20·62	30·9
Malda ...	61	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	16·3
Dinagepore ...	348	...	...	2	...	12	...	...	2	...	1	4	...	1	1	1	24	...	...	68·9
Rajshahye ...	637	8	...	3	...	23	...	3	5	...	...	1	...	5	...	1	49	12·56	64·36	76·9
Rungpore ...	285	...	...	...	1	25	...	...	1	...	4	...	...	3	...	1	35	...	...	122·8
Bogra ...	149	...	...	4	1	3	...	...	1	...	1	...	...	2	...	...	12	...	...	80·5
Mymensingh ...	610	...	...	2	...	12		...	1	...	2	...	...	4	1	1	23	...	...	37·7
Pubna ...	187	...	...	1	...	2		1	2	...	...	...	...	...	...	1	7	...	...	37·4
Furreedpore ...	315	...	...	3	...	...	...	...	1	...	2	...	...	...	...	1	7	...	...	22·2
Backergunge ...	393	3	...	4	...	25		1	...	...	...	...	...	...	...	3	36	7·63	83·97	91·6
Noacolly ...	211	...	...	1	...	...	...	...	...	...	1	...	...	...	1	1	4	...	...	18·9
Chittagong ...	225	...		...	...	1	...	...	3	...	1	...	...	...	...	...	5	...	...	22·2
Tipperah ...	337	...	1	...	...	2		...	...	...	2	...	...	2	...	1	8	...	...	23·7
Dacca	567	4	4	1	...	...	1	...	...	...	2	...	...	1	...	2	15	7·06	19·40	26·4
Sylhet	392	1	...	1	...	2		...	...	...	...	...	...	...	...	...	4	2·55	7·65	10·2
Shillong ...	50	...	...	1	...	2	...	...	...	...	...	1	...	1	1	...	6	...	...	120·0
Cachar ...	123	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	2	...	...	16·2
Naga Hills ...	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	None	...	...	...
Gowalparah ...	113	1	...	...	...	1	...	...	...	...	...	1	...	2	...	...	5	8·85	35·40	44·2
Gowhatty ...	115	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	2	...	...	17·3
Seebsaugor ...	133	1	...	1	...	2	...	...	...	...	...	...	...	...	...	1	5	7·52	30·08	37·6
Nowgong ...	72	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	2	...	...	27·7
Tezpore ...	198	...	...	1	...	1	...	...	1	...	...	...	...	1	...	2	6	...	...	30·3
Debrooghur ...	83	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	None	...	...	...
Midnapore ...	1,038	7	...	2	...	6	3	...	8	1	5	3	...	10	2	8	50	6·75	41·42	48·1
Balasore ...	141	...	...	1	...	2	1	...	...	...	...	...	...	...	...	1	5	...	...	35·4
Cuttack ...	257	26	...	1	...	1	...	...	...	...	...	...	...	1	...	1	30	101·17	15·56	116·7
Pooree ...	106	3	...	...	...	1	...	...	...	...	...	...	...	...	...	...	4	28·30	9·44	37·7
Monghyr ...	323	1	...	...	...	5	...	...	...	...	1	...	...	...	...	...	7	3·10	18·57	21·6
Bhaugulpore ...	404	1	...	...	...	2	...	...	...	...	...	...	...	2	1	1	7	2·48	14·85	17·3
Purneah ...	308	1	...	2	...	3	...	1	1	...	...	2	...	1	...	2	13	3·25	38·96	42·2
Julpigoree ...	112	...	...	...	...	8	...	...	1	...	...	...	...	...	...	...	9	...	...	80·3
Darjeeling ...	61	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	16·3
	14,143	121	5	52	3	218	6	12	49	4	40	17	...	56	10	65	658	8·56	37·96	46·5
Chyebassa ...	84	1	...	...	...	1	...	...	...	...	...	...	...	...	...	1	3	11·90	23·81	35·7
Ranchee ...	243	9	...	...	...	4	...	...	...	...	...	3	...	1	...	...	17	37·04	32·96	70·0
Hazareebaugh, Central	712	12	...	1	...	1	...	1	...	1	...	...	...	1	...	1	18	16·86	8·42	25·2
" District	286	8	...	...	...	1	...	...	1	...	...	...	...	1	1	...	12	27·98	13·98	41·9
Gyah ...	409	1	1	...	...	8	...	...	...	...	3	...	2	2	2	...	19	2·44	44·01	46·4
Patna ...	454	8	...	...	...	15	...	...	...	...	3	1	...	1	...	1	29	17·62	46·26	63·8
Deogah & Debree Ghat†	543	16	...	2	1	6	...	...	6	...	1	...	...	...	...	1	33	29·47	31·30	60·7
Arrah ...	331	...	...	2	...	2	...	...	1	...	...	...	...	...	...	4	9	...	...	27·1
Chumparun ...	196	...	...	...	...	3	...	...	1	...	...	1	...	...	1	1	7	...	...	35·7
Mozufferpore ...	345	...	...	2	...	15	...	...	3	...	...	...	...	...	...	...	20	...	...	57·9
Chuprah ...	294	1	...	...	...	7	...	1	...	...	...	...	...	...	...	...	9	3·40	27·21	30·6
Ghazeepore ...	495	...	...	2	...	11	...	...	1	...	...	...	...	...	...	1	15	...	...	30·3
Benares, Central ...	1,286	...	...	3	...	10	...	...	2	1	6	...	...	2	...	...	24	...	...	18·6
" District ...	515	...	...	2	...	13	...	...	...	...	...	...	...	...	1	2	18	...	...	34·9
Mirzapore ...	280	...	...	3	1	6	...	1	3	...	...	...	...	...	...	2	16	...	...	57·1
Azimghur ...	393	...	...	1	...	6	...	...	2	...	...	...	...	2	...	...	11	...	...	28·0
Jounpore ...	332	30	...	1	...	14	...	1	...	...	...	...	...	3	...	1	50	90·36	60·24	150·6
Goruckpore ...	513	1	1	7	...	29	...	...	1	...	...	2	...	9	...	1	51	1·95	97·46	99·4
Bustee ...	163	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	3	...	...	18·4
Gondah ...	463	...	...	1	...	3	...	...	2	...	1	1	1	5	...	1	15	...	...	32·4
Baraich ...	358	...	...	2	...	3	...	...	1	...	...	...	...	1	...	...	7	...	...	19·5
Fyzabad ...	735	...	...	1	...	17	...	...	...	...	3	2	...	...	...	...	23	...	...	31·2
Sultanpore ...	429	...	...	...	...	8	...	...	1	1	...	...	...	...	1	...	11	...	...	25·6
Rae Bareilly ...	324	...	...	3	1	1	...	...	...	...	...	1	...	...	...	1	7	...	...	21·6
Pertabghur ...	145	...	...	1	1	1	...	...	...	...	...	...	...	...	...	1	4	...	...	27·5
Hurdui ...	283	...	...	...	...	...	...	...	1	...	...	...	...	1	...	1	3	...	...	10·6
Khoree ...	233	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	4·2
Lucknow, Central ...	1,735	...	1	4	...	21	1	...	2	...	12	1	...	8	1	1	52	...	...	29·9
" District ...	1,042	1	...	...	...	12	...	...	...	...	8	1	...	...	...	1	23	·96	21·11	22·0
Seetapore ...	837	...	...	...	...	2	...	...	...	...	2	...	...	1	...	2	7	...	...	8·3
Nawabgunge ...	135	...	...	1	...	4	...	...	...	...	...	...	...	1	...	...	6	...	...	44·4
Oonao ...	188	...	...	...	...	3	...	...	...	...	...	...	...	1	...	...	4	...	...	21·2
Humeerpore	153	...	...	...	...	3	...	...	3	...	...	...	...	1	1	1	9	...	...	[illegible]
Oraie ...	136	...	...	2	...	5	1	...	...	...	...	...	...	...	1	2	11	...	...	[illegible]

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* Chiefly sickly prisoners sent for change from Allipore Jail.

† The prisoners were removed from Deegah Jail in March; seven deaths occurred in the Deegah Jail.

STATIONS.	Average Strength for the Year.	Causes of Deaths.															Number of Deaths.	Died per 1,000 of the Average Strength.		
		Cholera.	Smallpox.	Fevers.	Apoplexy.	Dysentery and Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.		A. Cholera.	B. All other Causes.	C. All Causes.
Futtehghur, Central	818	...	...	2	...	9	1	...	2	...	1	...	...	...	...	1	16	...	...	19·56
„ District	375	...	...	...	...	3	...	...	.	...	...	..	...	...	...	...	3	..	...	8·00
Cawnpore ...	418	...	...	1	...	5	...	...	...	...	2	.	...	4	1	3	16	...	...	38·28
Futtehpore ..	230	...	...	...	...	15	...	..	1	...	...	..	...	1	...	1	18	...	...	78·26
Banda ...	342	1	...	...	1	19	...	...	3	..	...	3	...	1	...		28	2·92	78·95	81·87
Allahabad, Central ...	1,717	..	...	16	...	83	1	...	6	1	2	..	...	12	...	12	133	...	...	77·46
„ District ...	687	...	..	1	...	12	...	...	2	...	...	...	...	6	1	1	23	...	...	33·48
Nagode	101	...	...	...	...	1	...	...	...	...	...	...	...	1	...	1	3	...	...	29·70
	19,757	89	3	61	5	386	4	4	45	4	44	16	3	66	11	46	787	4·50	35·33	39·83
Sumbulpore ..	60	...	...	1	..	2	...	...	...	...	...	...	...	...	...	1	4	...	...	66·67
Raepore	379	...	...	1	...	5	...	...	...	...	1	...	...	1	...	1	9	...	...	23·75
Belaspore	61	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	16·40
Mundla	48	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	None	...	...	...
Seonee .	102	...	...	...	...	2	...	...	..	...	...	...	...	..	...	1	3	...	...	29·41
Chindwarra ..	63	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	15·87
Baitool ..	64	...	...	...	...	...	...	...	...	...	.	..	...	1	...	...	1	...	...	15·62
Nursingpore ...	101	...	...	...	...	1	...	...	...	...	...	..	...	..	...	...	1	...	...	9·90
Hoshungabad	263	...	...	2	1	5	...	...	1	...	...	...	...	2	..	...	11	...	...	41·82
Nimar ..	53	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	2	...	...	37·74
Sehore	25	...	...	1	...	...	...	...	1	...	...	...	...	...	...	1	3	...	...	120·00
Nagpore ...	781	...	...	3	...	12	1	...	6	1	...	...	10	1	1	8	43	...	...	55·06
Bhandara ..	69	...	...	...	...	3	...	...	...	..	...	...	...	...	1	...	4	...	...	57·97
Wurdah	43	...	...	...	...	...	...	...	...		...	...	...	...	...	...	None	...	...	...
Chanda ..	104	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	None	...	...	...
Sironcha ...	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	None	...	...	...
	2,227	..	...	8	1	31	1	...	9	1	1	...	10	6	2	13	83	...	37·27	37·27
Jubbulpore ...	637	1	...	1	...	24	...	...	4	..	...	...	...	4	...	6	40	1·57	61·22	62·79
Dumoh ...	74	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	2	...	...	27·03
Saugor ...	180	...	...	4	...	6	...	...	...	...	...	2	...	...	1	2	15	...	...	83·33
Lullutpore .	151	...	...	...	...	5	...	...	2	...	...	...	...	2	...	1	10	...	...	66·23
Jhansi ..	254	...	...	3	...	3	...	...	5	...	...	...	...	1	...	1	13	...	...	51·18
Ajmere ...	363	...	...	1	1	7	...	...	2	...	...	...	...	1	...	...	12	...	...	33·06
Beaur	74	...	...	...	...	...	...	...	1	...	...	2	...	...	...	...	3	...	...	40·54
Muttra	213	...	...	2	...	...	...	...	...	...	...	...	...	..	...	1	3	...	...	14·09
Agra, Central ..	1,68[illegible]	...	...	1	...	9	4	[illegible]	8	...	2	...	...	...	1	2	30	...	...	17·80
„ District ..	520	...	...	...	...	4	...	1	5	...	...	...	...	...	1	1	12	...	...	23·08
	4,150	1	...	13	1	50	4	4	27	...	2	4	...	8	3	14	140	·24	33·19	33·73
Etawah ...	247	...	...	1	1	2	...	1	...	...	1	...	..	1	...	..	7	..	...	28·34
Mynpoorie ...	294	...	...	1	...	3	..	...	..	...	...	...	...	1	1	...	6	...	...	20·41
Etah ..	233	...	...	...	1	1	...	...	...	...	...	...	...	...	...	.	2	...	...	8·58
Allyghur ...	528	...	...	2	...	...	...	...	1	...	...	...	...	...	...	1	4	...	...	7·58
Boolundshuhur ...	157	...	...	...	...	2	..	...	...	...	...	...	...		...	..	2	...	...	12·74
Shahjehanpore ...	298	...	...	2	...	3	..	..	...	...	...	2	...	...	..	.	7	...	...	23·40
Budaon ...	302	...	...	...	...	...	...	.	...	..	..	.	...	3	...	...	3	...	...	9·93
Bareilly, Central ...	1,340	...	...	40	...	20	...	...	2	...	...	...	..	10	...	5	77	...	...	57·46
„ District (10 months) ...	494	...	...	7	...	4	...	...	2	...	...	...	...	2	..	...	15	..	...	30·36
Moradabad ...	322	...	...	1	...	7	..	...	1	...	1	..	[illegible]	6	...	2	18	...	...	55·90
Almorah ...	146	..	...	...	...	4	...	...	2	..	...	...	.	...	...	..	6	..	...	41·10
Deyrah ...	49	...	...	...	...	...	...	..	...	...	...	...	...	..	...	1	1	...	...	20·41
Bijnore ...	221	...	...	..	...	1	...	...	...	..	...	...	..	..	...	..	1	...	...	4·52
Saharunpore ...	219	...	...	3	...	21	...	...	2	...	1	...	...	3	...	1	31	...	...	141·55
Mozuffernuggur ...	112	...	...	3	...	6	...	..	...	...	...	..	...	...	...	...	9	...	...	80·36
Meerut, Central ...	1,330	...	...	8	...	82	...	...	15	1	5	1	...	13	1	9	135	...	...	101·50
„ District ...	524	...	...	2	...	41	...	...	6	...	...	1	...	4	...	1	58	...	...	110·69
	6,816	...	...	70	2	200	...	1	31	1	8	4	...	43	2	20	382	...	56·04	56·04
Delhi ...	366	...	...	9	...	12	...	...	3	...	...	...	...	...	...	3	27	...	...	73·77
Rhotuck ...	209	...	...	...	...	4	...	...	...	...	...	.	...	...	...	1	5	...	...	23·92
Hissar ...	218	...	...	3	...	...	...	...	4	...	3	...	...	...	...	1	11	...	...	50·46
Sirsa ...	342	...	...	2	...	...	1	...	4	...	.	1	...	...	1	...	9	..	...	26·32
Kurnaul ...	226	...	...	...	...	...	...	...	2	...	...	...	.	3	...	...	5	...	...	22·12
Umballa ...	705	...	...	2	...	11	...	...	1	...	...	1	...	1	...	1	17	..	...	24·11
„ Gang at Roopar	387	...	...	5	...	3	...	...	3	...	...	...	...	..	...	1	12	...	...	31·01
Loodianah ...	270	...	...	6	...	3	..	...	1	...	...	...	..	1	1	1	13	...	...	48·15
Jullundur ...	372	...	...	...	...	4	...	...	...	...	...	...	...	1	...	3	8	...	...	21·51
Ferozepore ...	390	...	...	...	...	1	...	...	...	...	...	...	...	...	.	..	1	...	...	2·56
Umritsur ...	537	...	...	3	1	3	...	..	4	...	1	1	..	...	..	...	13	...	...	24·21
Lahore, Central ...	2,190	...	...	43	1	17	...	1	20	.	4	...	...	1	...	5	92	...	...	42·01
„ Female Jail...	186	...	...	3	1	11	...	...	1	...	...	...	...	1	...	1	21	...	...	112·90
Sealkote ...	369	...	...	1	...	...	..	...	1	...	...	..	..	...	...	3	4	...	...	10·84
Dhurmsala ...	146	...	...	...	...	2	...	...	...	..	...	...	...	...	1	...	3	..	...	20·[illegible]
Goordaspore ...	295	...	...	2	...	2	...	...	2	...	...	...	..	1	...	...	7	...	...	23·73
Goojranwalla ...	445	...	...	...	...	1	...	...	1	...	..	...	...	...	...	3	5	...	...	[illegible]1·24
Goojrat ...	327	...	...	2	...	..	...	...	2	..	..	...	...	...	..	...	4	...	...	12·23
Shahpore ...	315	...	...	1	...	1	...	...	1	..	.	...	.	...	...	2	5	...	...	15·87
Jhelum ...	244	...	...	4	...	1	...	...	2	...	..	..	..	...	...	...	7	...	...	28·69
Montgomery ...	637	...	...	13	...	2	...	...	4	...	...	...	...	...	1	...	20	...	...	31·90
Mooltan ...	729	...	...	6	1	4	...	...	30	...	3	...	...	...	1	3	48*	...	...	65·84*
Jhung ...	361	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	2	...	...	5·54
Dera Ghazee Khan ...	467	...	..	2	...	...	...	...	3	...	...	1	...	...	...	1	7	...	...	14·99
Dera Ismael Khan ...	303	...	...	3	...	2	1	...	6	...	...	...	...	...	1	1	14	...	...	36·57
Kohat ...	155	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	2	...	...	12·90
Bunnoo ...	106	...	...	2	...	1	...	...	2	...	...	...	...	...	...	...	5	...	...	47·17
Rawulpindee ...	942	...	...	28	...	11	1	1	19	...	...	...	1	1	1	4	67	...	...	71·13
Peshawur ...	496	...	...	9	...	5	...	..	9	..	..	...	...	...	1	2	26	...	...	52·42
	12,785	...	...	150	5	104	3	2	120	...	11	4	1	11	8	35	400	...	35·98	35·98
BENGAL PRESIDENCY	59,878	211	8	354	17	908	18	23	287	10	146	45	14	190	36	193	2,510	3·52	38·40	41·92

* Eighteen prisoners were liberated on account of pneumonic disease; of these, three died in the dispensary at Mooltan.

JAILS OF THE BENGAL PRESIDENCY, 1870.

XIII.

DETAIL of the ADMISSIONS and DEATHS of the JAIL POPULATION of each PROVINCE.

(A Summary of the Annual Returns of the Jails of the Presidency.)

CAUSES OF ADMISSIONS AND DEATHS.	BENGAL PROPER AND ASSAM. Strength ... 14,143 Admissions ... 16,569 Deaths ... 659		CHOTA NAGPORE, BEHAR PROVINCES, BENARES, OUDE AND CAWNPORE. Strength ... 19,757 Admissions ... 16,141 Deaths ... 789		CENTRAL PROVINCES (EXCLUDING JUBBULPORE AND SAUGOR.) Strength ... 2,237 Admissions ... 3,123 Deaths .. 86		AGRA AND CENTRAL INDIA. Strength ... 4,150 Admissions ... 2,963 Deaths ... 141		MEERUT, AND ROHILCUND. Strength ... 6,816 Admissions ... 5,314 Deaths ... 383		PUNJAB. Strength ... 12,795 Admissions ... 13,716 Deaths .. 464	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Cholera ...	269.	121	265	89	...	...	1	1	...	...	...	...
Smallpox ...	18	5	55	3	...	..	...	...	...	...	...	.
Chickenpox ...	24	...	16	...	...	...	4	...	...	...	...	...
Measles ...	7	...	13	...	2	...	...	...	..	...	...	
Mumps ...	79	...	15	...	...	..	10	...	4	...	16	...
Influenza ...	6	...	2	...	5	...	1	...	...	...	17	..
Diphtheria ...	...	...	...	...	...	...	...	...	...	...	1	.
Hydrophobia ...	1	...	1	1	...	...	...	...	...	...	...	..
Erysipelas ...	17	2	30	5	3	1	7	...	4	3	26	3
Gangrene and Phagedæna ...	...	...	21	4	...	...	...	...	3	3	...	.
Intermittent Fever ...	7,041	22	6,653	34	1,459	2	1,346	5	2,309	14	6,319	105
Remittent and Continued Fever ...	138	30	185	27	27	6	113	8	267	56	132	45
Enteric Fever ...	...	...	...	...	...	...	...	...	...	...	...	
Rheumatism, Acute ...	301	...	233	...	124	2	130	...	65	...	133	1
" Chronic ...												
" Muscular ...	113	...	53	...	21	...	5	...	12	...	24	
Gout ...	2	...	...	...	...	...	...	...	...	...	1	..
Leprosy ..	20	2	31	1	3	...	2	1	2	1	6	1
Elephantiasis ...	12	...	3	...	...	...	...	...	...	...	...	
Primary Syphilis ...	105	..	150	...	34	...	51	...	51	...	28	
Secondary Syphilis ...	93	1	92	1	17	...	11	...	47	1	66	1
Cancer ...	3	2	1	...	1	...	...	...	..	...	1	...
Scrofula and Tuberculosis ...	33	25	6	1	3	...	...	...	11	1	13	..
Phthisis Pulmonalis ...	112	10	101	44	4	1	6	2	8	8	27	11
Hæmoptysis ...	33	...	10	...	...	...	5	...	6	...	7	..
Psoas Abscess ...	...	...	2	1	...	...	...	...	...	...	...	...
Anæmia ...	155	...	125	...	2	...	1	...	2	...	15	.
General Dropsy ...	34	13	32	12	...	...	5	3	7	3	10	3
Cancrum oris ...	5	1	...	...	...	...	...	...	...	...	...	1
Scurvy ..	28	...	33	3	17	10	31	...	4	...	24	1
Encephalitis ...	...	3	...	...	...	...	3	2	...	1	...	..
Apoplexy and Insolation ...	3	3	13	5	1	1	11	1	3	2	11	6
Paralysis* ...	10	1	6	...	...	...	1	...	4	...	7	.
Meningitis ...	1	1	3	2	...	...	...	...	1	1	2	3
Tetanus ...	4	4	1	1	..	...	1	1	...	...	1	1
Epilepsy ...	15	...	32	1	2	...	4	1	5	...	11	4
Hysteria ...	5	...	3	...	1	...	1	...	...	..	...	...
Chorea ...	...	...	1	...	...	...	...	...	...	...	...	...
Neuralgia ...	28	...	15	..	5	...	3	...	1	...	25	...
Cephalæa ...	1	...	3	.	7	...	1	...	4	..	2	...
Mania ...	69	1	50		3	...	2	...	13	...	11	1
Melancholia ...	3	...	1	...	...	...	...	...	...	...	...	...
Dementia ...	13	...	2	1	...	...	1	...	...	...	...	..
Amaurosis ...	1	...	2	..	...	.	...	...	...	...	...	...
Nyctalopia ...	1	...	1	.	...	...	...	...	...	...	...	...
Ophthalmia ...	138	...	204	1	30	...	41	...	119	...	205	...
Otitis ...	29	...	37	...	12	...	10	...	6	...	17	...
Deafness ...	...	...	...	..	...	...	...	...	...	..	...	...
Epistaxis ...	5	...	6	...	2	...	1	..	...	...	6	...
Ozæna ...	1	...	8	3	...	...	2	...	1	...	...	...
Pericarditis .	2	2	...	...	...	1	1	1	...	...	2	..
Valve Disease of Heart ...	2	1	3	...	1	1	...	...	1	...	...	..
Hypertrophy of Heart ...	5	3	2	1	...	...	...	...	...	...	...	...
Fatty Degeneration of Heart ...	...	...	5	3	...	...	...	...	...	1	...	...
Aneurism ...	...	...	...	...	...	...	...	...	...	...	...	...
Embolism ...	1	1	...	...	1	1	...	...	...	..	1	...
Angina Pectoris ...	...	...	...	...	...	...	...	...	...	...	...	...
Palpitation ...	...	...	...	...	...	...	...	...	...	...	1	..
Syncope ...	...	...	...	...	...	...	...	...	1	...	...	...
Phlebitis ...	2	...	...	...	...	...	...	...	...	...	...	...
Varicose Veins ...	...	...	...	...	...	...	...	...	...	...	...	...
Glandular Inflammation ...	18	...	9	...	1	...	1	...	...	...	...	...
Bronchocele ...	5	...	7	1	...	..	1	..	...	...	2	...
Laryngitis ...	3	1	...	...	1	...	1	1	3	1	8	1
Bronchitis ...	250	2	167	6	79	4	122	4	58	4	303	19
Asthma ...	91	...	84	3	5	...	10	...	18	2	18	...
Pneumonia ...	180	39	75	29	21	5	84	20	43	22	297	93
Gangrene of Lungs ...	3	3	1	1	...	...	...	...	...	...	...	...
Pleurisy ...	31	4	87	6	9	...	78	2	22	2	88	13
Aphtha ...	4	...	1	...	1	...	...	...	...	...	2	...
Odontalgia ...	4	...	2	...	3	...	3	...	6	...	2	...
Stomatitis ...	24	...	16	...	1	...	2	...	3	...	1	..
Tonsillitis ...	12	...	14	...	4	...	6	...	3	...	10	..
Gastritis ...	3	...	2	...	...	...	3	...	1	...	4	..
Enteritis ...	6	3	7	4	1	1	...	...	3	4	4	5
Peritonitis ...	9	9	6	5	...	...	1	...	...	...	8	5
Hernia ...	6	...	3	...	...	...	...	...	1	...	10	...
Ileus ...	1	1	...	1	...	...	1	1	...	...	2	2
Hæmatemesis ...	...	...	...	...	1	...	...	...	...	...	...	...
Melæna ...	...	...	1	...	...	...	...	...	...	...	...	...
Dyspepsia ...	702	...	89	..	14	...	16	...	46	..	246	...
Colic ...	145	..	146	...	36	...	47	...	68	...	171	...
Constipation ...	175	...	43	...	17	...	13	...	2	...	13	...
Dysentery ...	1,939	156	2,036	251	195	10	470	46	517	141	793	67
Diarrhœa ...	1,771	62	1,606	135	183	12	276	13	453	56	683	37
Hæmorrhoids ...	71	...	37	...	6	..	8	...	8	..	24	...
Fistula in ano ...	5	...	6	1	...	...	...	...	...	...	2	...

* Hemiplegia 7, Paraplegia 6, General Muscular 1, Character not specified 16.

CAUSES OF ADMISSIONS AND DEATHS.	Bengal Proper and Assam.		Chota Nagpore, Behar Provinces, Benares, Oude, and Cawnpore.		Central Provinces (excluding Jubbulpore and Saugor.)		Agra and Central India.		Meerut and Rohilcund.		Punjab.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Worms, Ascarides	4	...	2	...	...	...	2	...	...	...	1	...
„ Tape Worm	5	...	5	...	2	...	3	...	1	...	4	...
Spleen enlargement	246	12	104	3	14	...	34	4	19	1	73	2
Hepatitis	34	6	8	4	1	1	13	4	4	...	7	3
Cirrhosis	1	1	...	1	...	...	...	...	...	...	...	.
Jaundice	14	...	41	..	1	...	45	...	21	...	9	1
Ascites	5	4	9	4	...	...	2	1	3	1	2	1
Nephritis	6	1	10	5	...	...	2	1	3	1	8	.
Lithiasis	...	...	...	...	...	...	...	...	...	...	1	.
Calculus	1	...	3	...	...	...	1	...	...	...	1	.
Cystitis	5	...	...	...	...	...	1	..	...	...	2	.
Hæmaturia	2	...	1	...	...	...	1	...	8	..	6	.
Diabetes and Diuresis	9	...	...	...	1	...	1	...	...	...	3	..
Enuresis	...	...	...	...	...	...	...	...	...	...	1	...
Ischuria	...	...	...	...	2	...	...	...	2	...	...	.
Stricture of Urethra	12	...	6	...	1	...	4	...	...	...	...	.
Urinary Fistula	...	...	3	...	...	...	...	..	...	...	3	1
Gonorrhœa	42	...	28	...	5	...	10	...	6	...	26	.
Phimosis	15	...	10	...	4	...	11	...	4	...	6	.
Bubo and Venereal Sore	32	...	25	...	8	...	4	..	6	...	15	...
Orchitis	30	...	18	..	2	...	6	..	10	...	27	
Hydrocele	28	...	8	...	2	...	...	...	...	...	...	...
Varicocele	1	...	...	...	...	...	...	...	...	...	...	...
Periostitis	4	...	4	...	6	1	...	...	1	...	1	...
Caries	...	...	7	...	...	...	...	...	2	...	1	...
Necrosis	3	...	5	...	...	..	...	...	1	.	3	...
Synovitis	7	...	9	...	...	...	...	...	1	...	5	..
Contraction	1	...	...	...	...	..	...	..	...	...	...	..
Atrophy of Muscle	...	...	1	...	...	...	2	...	...	...	...	..
Phlegmon and Abscess	290	4	883	1	122	...	127	2	305	...	603	3
Ulcer	168	...	569	4	275	5	327	4	298	3	256	..
Whitlow	19	...	42	...	15	...	8	...	10	...	57	..
Carbuncle	11	...	9	...	3	.	6	..	11	1	8	1
Boils	110	...	109	...	129	...	37	...	9	...	32	..
Itch	231	...	127	...	41	...	28	...	25	...	160	..
Skin Diseases	77	...	89	...	10	...	85	...	22	...	39	...
Guinea Worm	...	...	2	...	4	...	42	...	1	..	69	...
Tumour	5	...	9	...	...	...	2	.	3	...	1	..
Childbirth	8	1	10	...	5	1	5	..	3	..	28	1
Abortion	1	...	2	...	...	.	1	...	...	..	2	1
Phlegmasia Dolens	1	...	...	...	...	...	...	.	...	...	...	...
Menorrhagia	3	...	4	...	1	...	...	...	...	..	...	..
Dysmenorrhœa	1	...	1	...	...	...	...	..	...	.	..	..
General Debility	94	55	187	68	11	6	21	8	97	43	39	11
Burning	25	...	30	...	10	...	3	.	9	..	7	..
Wound and Contusion	483	4	478	8	60	1	124	1	135	1	252	6
Fracture	21	...	67	1	1	...	9	...	38	.	26	2
Dislocation	3	...	12	...	...	.	3	..	2	..	4	...
Sprain	6	...	24	...	14	...	4	..	5	..	3	...
Poisoning	3	...	2	...	...	...	1	...	1	...	1	...
Snake-bite	4	1	1	1	...	...	...	...	...	...	2	...
Suicide	...	4	...	2	...	2	...	2	...	...	...	1
Accident	...	1	...	...	...	1	...	...	...	...	...	1
Struck by Lightning	...	...	...	1	...	...	...	...	...	...	...	...
Drowned	...	1	...	1	...	1	...	1	...	2	...	1
Punished	5	...	42	...	8	...	13	...	11	.	15	...
Cause not specified	...	..	1	...	...	...	...	..	..		...	...

SUMMARY FOR 1870.

DETAIL of the ADMISSIONS and DEATHS of the EUROPEAN and NATIVE ARMIES and the JAIL POPULATION of the BENGAL PRESIDENCY.

CAUSES OF ADMISSIONS AND DEATHS.	ADMITTED INTO HOSPITAL, AND DIED IN AND OUT OF HOSPITAL.											
	EUROPEAN ARMY.		NATIVE TROOPS.								JAIL POPULATION.	
	Bengal Presidency.		Bengal Proper and Assam.		Upper Provinces.		Central India Force.		Punjab Frontier Force.		Bengal Presidency.	
	Average Strength 33,373 Admitted 57,344 Died ... 731		Strength ... 7,248 Admitted ... 10,514 Died ... 129		Strength ... 32,535 Admitted ... 49,111 Died ... 503		Strength ... 4,054 Admitted ... 4,723 Died .. 44		Strength ... 10,394 Admitted ... 21,706 Died ... 164		Average Strength 59,873 Admitted ... 58,606 Died ... 2,533	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Cholera ...	54	21	37	22	18	8	1		...		535	211
Smallpox ...	21	6	9	..	49	5	2	1	1	1	74	8
Chickenpox ...	1	..	3		10		4		...	...	44	
Measles ...	5	...	1	...	7		...		...		23	
Mumps ...	11	...	150		51	1	1		40	..	124	
Influenza ...	88		23		47		7		171	...	31	
Diphtheria ...	1	1	...		2	2	...		...	...	1	
Scarlet Fever ...	1		...		...		...		...		...	
Pyæmia ...	1	2	...		1	1	...		...		...	
Hydrophobia ...	2	2	...		1	1	...		2	1	2	1
Erysipelas ...	57	2	6	...	24	...	2		9		87	14
Gangrene and Phagedæna ...	2		..	...	1	...	...		...		24	7
Intermittent Fever ...	20,730	3	4,755	13	28,292	112	2,592	14	13,654	23	27,129	182
Remittent and Continued Fevers ...	6,915	140	63	8	279	55	34	5	115	24	882	172
Enteric Fever ...	85				3	...	...		...		...	...
Rheumatism, Acute ... " Chronic ...	1,597		245	1	1,053	1	122	...	260	1	980	3
" Muscular ...	333		102		390		24		217		227	...
Gout ...	4	...	...		5		...		...	...	3	...
Leprosy ...	...		3		7		4		2	...	64	6
Elephantiasis ...	...		...		...		...		...		15	
Primary Syphilis ...	1,359		117		520		91		63		410	...
Secondary Syphilis ...	832	9	50		174		21		53	1	346	4
Cancer ...	6	6	1	1	1		...	...	1		6	2
Scrofula and Tuberculosis ...	45		4	1	17	1	...		2	...	68	27
Phthisis Pulmonalis ...	337	49	20	11	59	21	2		14	6	258	108
Hæmoptysis ...	18		9		19	...	1		1	...	61	
Psoas Abscess ...	1		...		1		...		...	1	2	1
Morbus coxæ ...	1		...	...	...		...		...		...	...
Anæmia ...	314	1	32		91	...	1	...	67		300	...
General Dropsy ...	7		7	2	4	2	2		2		88	36
Cancrum oris ...	...		1	1	1	1	...		...	...	5	3
Scurvy ...	30		48	5	59	1	1		26	1	137	14
Encephalitis ...	23	3	...		7	2	...		...	...	3	8
Apoplexy and Insolation ...	95	51	4	...	16	9	1		21	10	44	19
Paralysis ...	39	2	2	1	37	3	5		13	1	30	1
Meningitis ...	4	4	...		1	1	...	...	...	...	7	6
Myelitis ...	3	2	...	...	...		...		...		...	...
Tetanus ...	2	2	...		1	...	1	1	...		7	7
Epilepsy ...	114	1	5	1	17	...	...	...	8	...	69	6
Hysteria ...	...		1		...		...	...	...	...	10	...
Chorea ...	4	...	...		1		...	...	...	...	1	...
Paralysis agitans ...	2		...		...		...		...	...	...	...
Neuralgia ...	232	...	107	...	237	...	29	...	102	...	77	...
Anæsthesia ...	...	...	...	...	4	..	...	...	...	...	...	...
Cephalæa ...	...		..	...	...	...	..	...	...	...	18	..
Mania ...	40	...	2	...	15		...	...	3	...	148	2
Melancholia ...	...	...	1	...	2		...	...	1	...	4	...
Dementia ...	26		2		7		...		...	...	16	1
Hypochondriasis ...	3		...		...	...	...	...	...	...	...	..
Amaurosis ...	...		1		3		1		3	...	3	...
Nyctalopia ...	...		3		64	...	1	...	13		2	...
Ophthalmia ...	868		121		864	...	104	...	287	...	737	1
Otitis ...	213	...	76	...	132	...	11	...	79	...	114	
Deafness ...	41		6		29	...	1	...	7	...	...	
Epistaxis ...	27		1	...	5	...	...		4	...	20	
Polypus nasi ...	...		...		1	...	...	...	2	...	...	...
Ozæna ...	3		1	...	2	...	...	...	1	...	12	3
Pericarditis ...	22	5	...	...	7	1	...	...	...	...	5	4
Valve disease of Heart ...	138	20	2	1	10	2	1	...	..	...	7	2
Hypertrophy of Heart ...	87	7	...	...	3	...	...	...	1	...	7	4
Fatty degeneration of Heart	4	4	1	1	4	3	...	1	..	...	5	4
Aneurism, aortic ...	32	18	1		2	2	...	...	2	1	...	...
Embolism ...	...		...		...	...	...	...	...	...	3	2
Angina Pectoris ...	3		...		2	...	...	...	...	...	...	...
Palpitation ...	223		...		3	...	...	...	...	...	1	...
Syncope ...	1		...		4	...	...	...	3	...	1	..
Phlebitis ...	1	..	1		...	...	...	...	2	...	2	...
Varicose Veins ...	11	...	4		3	...	...	...	1	...	...	...
Rupture of Jugular Vein ...	1	1	...	...	...	...	...	...	...	...	...	...
Glandular Inflammation ...	619	..	18	...	40	...	8	...	12	...	20	...
Bronchocele ...	...	...	50		81	...	...	...	...	..	15	1
Disease of Supra-renal Capsules ...	1	1	...	...	...	...	...	...	...	...	...	...
Laryngitis ...	5		4		19	...	...	...	9	2	16	4
Aphonia ...	2		...	..	...	...	...	...	...	..	...	...
Bronchitis ...	1,389	6	377	5	736	17	62	1	215	10	879	39
Asthma ...	6	1	27		51	3	4	...	15	...	220	5
Pneumonia ...	143	43	10	3	376	83	30	4	194	37	700	209
Gangrene of Lungs ...	...	...			...	1					4	4
Pleurisy ...	127	1	12	...	160	14	6	...	58	3	265	27
Aphtha ...	...		...	...	...	...	...	...	...	...	9	...
Odontalgia ...	11		9	...	34	...	3	...	16	...	38	...
Hæmorrhage after tooth extraction ...	1		...	...	...	...	...	...	...	...	...	...
Stomatitis ...	28	...	21	...	20	...	4	...	18	...	47	...
Tonsillitis ...	613	...	18	1	100		11	...	[illegible]	...	49	...